ROYAL GARDENS, KEW.

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CCCXV.—SUGAR-CANE DISEASE.

The following correspondence relates to a disease which has, within the last few years, made its appearance amongst the sugar-canes in the West Indies, and has caused some apprehension. Considerable controversy has arisen as to whether it is an independent disease, or one consequent on previous injury by insect borers. The question has been further complicated by the fact that the fungus at different periods of its life-history exhibits three different and distinct forms, leading to the supposition, erroneous as it turns out, that the sugar-cane may be affected by more than one parasitic fungus.

ROYAL GARDENS, KEW, to COLONIAL OFFICE.

Royal Gardens, Kew,
April 5, 1893.

SIR,

I HAVE the honour to inform you that for some time past numerous communications have been addressed to this establishment, respecting a disease which has made its appearance in the West Indies amongst the sugar-canes.

2. The injuries which the canes suffer from the attacks of insects, popularly known as "borers," have long been known, and have been now pretty completely studied. A tolerably exhaustive account, embodying everything that is at present ascertained, by Mr. Blandford, will be found in the number of the *Kew Bulletin* for July and August of last year.

3. The disease which is now complained of is of a more insidious kind, and is due to the attacks of a minute fungus. Considerable discussion has arisen as to whether the mischief is produced by one fungus or by several, and further as to whether the attacks of the fungus precede, follow, or are concomitants of the injury inflicted by the borers.

4. Such material for investigation as has been hitherto sent to Kew from the several botanical establishments in the West Indies has been inadequate, and has only yielded ambiguous results. I, however, received a letter early this year, from Mr. John R. Bovell, Superintendent of the Botanical Station at Dodd's Reformatory, Barbados, from which I enclose an extract, advising me of the dispatch of a very complete series of diseased canes.

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5. I entrusted these to Mr. George Massee, a well-known expert in mycology, who made a careful study of them in the Jodrell Laboratory at Kew. I enclose a copy of the preliminary report with which he has furnished me. This completely establishes that—

(i.) The disease is due to a fungus, a species of *Trichosphæria*; this, like many allied minute fungi, has the peculiarity of possessing more than one reproductive phase. These different phases have been mistaken for distinct fungi, but as a matter of fact they are not so, but are capable of reproducing one another.

(ii.) The *Trichosphæria* is evidently a very destructive parasite. It can effect a lodgment on the young leaves of the sugar-cane, but not on the mature ones. But it readily takes advantage of any wound, such as is produced by the removal of young shoots, or by the different kinds of "borers." It is this latter circumstance which has led the malady which the fungus produces to be regarded as having some connexion with the "borers."

6. No practical remedy can be suggested to check the progress of the disease, beyond the "cutting out" and the careful destruction by *burning* of every diseased cane.

7. I may be permitted to suggest that a copy of this letter should be communicated to the Government of Barbados, and to such other of the West Indian Colonies, interested in sugar production, as the Secretary of State may deem desirable.

8. I may add that Mr. Massee proposes to publish a detailed account of the *Trichosphæria*, which possesses many points of scientific interest, in the "Annals of Botany."

I am, &c.

(Signed) W. T. Thiselton-Dyer.

The Hon. R. H. Meade, C.B.
Colonial Office,
Downing Street, S.W.

Extract from Letter from the Superintendent, Botanical Station, Dodd's Reformatory, Barbados, dated February 11, 1893.

As the question of a fungus attacking canes which have not been first injured by the moth-borer is still a very debatable point with those over your way who take an interest in the matter, I am sending you by mail steamer to-day a box containing (1) canes which have been just attacked by the fungus, and in which no shot or moth-borers are present as yet, as far as I can see without cutting up the cane; (2) canes which have been attacked with the fungus a little longer and in which shot-borers have entered but no moth-borer; (3) canes with fungi, shot-borer and moth-borer; (4) canes killed by moth-borer only.

Preliminary Report on the Sugar-cane Disease.

The abundant supply of living material, consisting of 18 large canes, illustrating every stage of the disease, sent to Kew for investigation by Mr. Bovell from Barbados, has enabled the vexed question as to the part played by fungi in connexion with the sugar-cane disease to be conclusively settled.

Each cane was accompanied by a description of the supposed cause of disease, as, killed by "shot-borer," "moth-borer," "fungus," and in some cases two or all the above were described as being present on the same cane.

Microscopic examination showed the presence of the fungus in every cane, but in some instances, owing to the absence of fruit, its presence could not be detected by the naked eye.

Only one fungus—an undescribed species of *Trichosphæria* was found on the canes. The idea entertained by some planters, that more than one fungus is connected with the disease, probably arises from the fact that the *Trichosphæria* has at least three distinct forms of fruit, very different in general appearance, and whose development depends on the relative vitality of the canes.

Further experiments showed that *fully developed* leaves and stems cannot be infected on an unbroken surface; nevertheless, when the surface is broken, infection is readily effected. A cane about $1\frac{1}{2}$ in. diameter was inoculated by cutting a deep slit and introducing mycelium from a pure culture of the conidia; in 16 days the cane was split at this point, and the central portion was found to be coloured red for a distance of 3 in., and the mycelium had extended even beyond that distance; the microscope showed the presence of the dark olive conidia formed in tissues away from the light. Infection also readily takes place at points where lateral branches have been broken off.

Summary.—1. The experiments described above prove that the *young* leaves of the sugar-cane can be infected by the spores of *Trichosphæria* falling on an unbroken surface, and further, that the fungus acts as a true parasite, eventually killing the plant.

2. In older plants inoculation can only take place when the surface is wounded, but when an entrance through a wound is once effected the fungus acts as a destructive parasite.

3. The frequent presence of both fungus and moth-borer or shot-borer in the same cane is explained by the above statement.

Stage I.—Conidial condition, for the rapid reproduction of the species; appearing on the surface of wounded parts as a very delicate, dark-coloured velvety mass, or when old and very abundant, penetrating the internal tissue of the cane and producing a black charred appearance, due to the numerous chains of large olive-brown conidia.

Stage II.—Melanconium form, bursting through the cuticle of old canes in the form of minute black filaments. Often following the ravages of the "moth-borer" or "shot-borer" in dying or dead canes.

Stage III.—The ascigerous form. Minute, black, hairy perithecia, present only on dead and more or less decayed portions of cane.

The conidia from Stage I., obtained from a pure culture, were placed on the unbroken surface of *very young* leaves of lateral shoots of a healthy sugar-cane plant growing in the Lily House, Kew Gardens; in five days the infected areas showed deep red blotches, and in 14 days the conidial form of the fungus was perfectly developed, the mycelium in the meantime having passed into the shoot and adjoining leaves. Soon afterwards the young infected shoots decayed and dropped off, microscopic examination showing that the mycelium had passed into the tissues of the parent stem.

Assuming the insect to first pierce the cane, the spores of the fungus would find a suitable place for development in the wound; hence the presence of one parasite prepares the way for another, and the combined action of the two soon ends in the destruction of the plant. Nevertheless the fungus is not entirely dependent on the previous presence of the insect, but readily finds entrance at broken points, and can alone kill the cane.

Protective Measures.—The conidia of the fungus will not germinate, neither will the mycelium grow in a 1 per cent. solution of cupric sulphate; but spraying with the ordinary Bordeaux solution is in all pre-

bability not practicable, other than in the case of an experimental plot, and would certainly have no beneficial effect on an infected area.

Remembering that the mycelium of the fungus extends, as a rule, far beyond the range indicated by its presence to the naked eye in a given cane; and further, that almost every cane—judging from the material examined—attacked by the "moth-borer" or "shot-borer" is also infested with the fungus, it would be unwise to use apparently sound portions of such canes for propagation.

It was observed in those canes killed by the fungus alone that the disease was oldest and most mature near to the root, and this suggests the question, Was the cane, even if taken from a healthy stock, inoculated with the fungus spores on the cut and exposed surface of the portion used for propagation? As a preventive against this possible cause of inoculation, the cut surfaces might be painted with a solution of Bordeaux mixture immediately on being cut, and repeated at intervals.

It has been observed that the fungus causing the sugar-cane disease develops readily on the young leaves of the bamboo, the same may prove to be true of other members of the *Gramineæ*, hence a careful search should be made for such possible nurse-plants, as the spores would be carried for a considerable distance by the wind.

Finally, all diseased canes should be burnt, and not allowed to remain to rot, during which condition they are simply producing fresh material for the inoculation of other plants.

Previous to the receipt of the material reported on above, several consignments of diseased sugar-cane had been received at Kew from Mr. Hart from Trinidad, caused by the same species of fungus; but as the material was either dry or preserved in spirit no cultures or inoculations could be made.

April 4, 1893. G. M.

CCCXVI.—ALDABRA ISLANDS.

The Aldabra Islands are a group of coral islets, about 30,000 acres in extent, to the north-west of Madagascar, in about 9° 30′ S. lat. They are only about 200 feet high; the shore is fringed with mangroves, and the whole surface is said to be covered with forest. They have not till the present time been botanically investigated.

From a natural history point of view they are interesting as the home of a gigantic tortoise (*Testudo elephantina*), in dimensions comparable with that of the Galapagos (*Testudo elephantopus*).

The following correspondence gives some recent information about this little known group.

COLONIAL OFFICE to ROYAL GARDENS, KEW.

Downing Street,
29th July 1892.

SIR,

I AM directed by Lord Knutsford to transmit to you for your perusal a despatch from the Administrator of the Seychelles, in which that officer gives an account of a recent visit to the Aldabra Islands.

I am to request that this despatch, which is sent in original, may be returned.

I am, &c.
(Signed) EDWARD FAIRFIELD.

The Director,
Royal Gardens, Kew.

Government House, Seychelles,
13th June 1892.

SIR,

I HAVE the honour to report that Her Majesty's ship "Redbreast," Lieutenant-Commander Preedy, arrived here on the 12th of May, having directions from Rear Admiral Kennedy, Commander-in-Chief on the East India Station, to visit the Island of Aldabra and afford me an opportunity of also visiting these outlying islands of this Government if I desired to do so.

2. I decided, though so recently returned from Europe, to take advantage of the offer, and I embarked accordingly on the morning of the 20th May. After a remarkably unpleasant passage, owing to strong winds and severe rolling of the vessel, I arrived at Aldabra on the 23rd of May at eleven o'clock in the morning. The "Redbreast" entered the main channel of Aldabra and moored there. A current of at least six knots runs there at every rise and fall of the tide, and only steam vessels could make way against such a current.

3. Mr. James Spurs, to whom the islands are leased, resides, we discovered subsequently, quite on the other side of the island; he came on board when the tide permitted in the afternoon and recommended the Commander to change anchorage, which was accordingly done the next afternoon, when we steamed out and anchored off the island and also the western channel in about 17 fathoms of water.

4. The following morning I went on shore to visit Mr. Spurs' establishment and observe some of the natural peculiarities of this extraordinarily formed island, which, except here and there, appears to be one mass of very ancient coral, which has been washed for so many centuries by the sea that all the softer portions have been washed out and the remainder is hard and ragged, and therefore is difficult to walk over. Curious to state, small trees, shrubs, and vines flourish over it, and in these inextricable places, which are of vast extent, do the enormous land tortoises find a genial and apparently prolific existence.

5. When Mr. Spurs first went to Aldabra he was of opinion there were very few of them left, but he now states that there cannot be less than 1,000 in all the island. I made him repeat this statement more than once, as I was sceptical about so large a number, but he assured me that a few hundred would not accurately describe their number.

6. The number of edible turtles which it is possible for Mr. Spurs to secure both at Aldabra and the three neighbouring islands of this group is far in excess of his capabilities of dealing with them. It would be no exaggeration to say that from 12,000 to 15,000 could be turned in one twelvemonth in Aldabra alone. As no steamers call at Aldabra and only a small schooner two or three times a year, which latter takes some time to get back to Mahé, the majority of such turtle as are shipped invariably die. To be properly conveyed they must have shade and sea water.

7. The market price of a turtle weighing from 300 to 450 pounds in Mahé is from Rs. 18 to Rs. 30 according to the supply on hand, but it is a food that to many persons is simply obnoxious. The popular fallacy that turtle must be excellent because well-made turtle soup is so generally appreciated, is soon dispelled by those who partake of it in any other form, whilst the excellence of good soup is only produced by a variety of expensive ingredients.

Rock oysters are procurable in great quantities, and those of which I partook appeared to be very good.

8. Mr. Spurs complained also of the absence of rain at Aldabra, which is very detrimental to the crops he endeavours to raise on a certain portion of the island where such soil as exists is rich.

9. I did not visit Cosmoledo, the nearest of the other islands, but he informs me that there are large numbers of goats upon it, of which I saw several specimens which had been taken to Aldabra.

The Orchilla weed that grows upon the mangrove and other stunted trees about the place Mr. Spurs obtains in England 45*l.* a ton for, but the supply is not large.

10. I took with me to Aldabra a new flagstaff to replace the old one Mr. Spurs had been using, and also made him a present of some new flags. Mr. Spurs informs me he has upon five or six occasions observed steamers passing within a distance of seven miles off this island.

11. There are several small detached islets of coral in Aldabra which, by process of time, sea, and tide, have become exactly like an enormous mushroom in appearance; some of them are probably 50 feet in diameter.

Altogether the island is a very curious one, and I was glad of the opportunity to have visited it.

I have, &c.

His Excellency (Signed) T. Risely Griffith,
H. E. H. Jerningham, C.M.G., Administrator.
Administering the Government of Mauritius.

Subsequently to the visit of the Administrator the Aldabra islands were visited by Dr. W. L. Abbott, an American gentleman of independent means, whom Mr. Risely Griffith was good enough to interest in behalf of Kew. The account given by him of the islands adds something to that given in the despatch of the Administrator. The collections unfortunately miscarried and have not as yet reached Kew.

Dr. W. L. Abbott to Royal Gardens, Kew.

Mahé, Seychelles,
Dear Sir, March 15, 1893.

Your letter reached me a few weeks ago on my return from Aldabra. Am afraid my collection of plants does not amount to much. I am not a botanist, being altogether interested in Ornithology and Mammology, and have scarcely ever collected plants before my Aldabra trip. I do not know if the plants were properly prepared. On my arrival in Aldabra, in September, there were a few plants in flower and fruit; many did not have leaves. Then a period of two months occurred, during which no rain fell, and vegetation of every sort dried up. During December there was a heavy rainfall; nearly every plant put forth fresh leaves and bloomed. Was much bothered by mould and ants. The latter ate up nearly everything as fast as gathered. However I obtained specimens of *most* of the native plants. The papers are somewhat mixed up, specimens of fruit and flowers being frequently in separate papers; however they can be picked out without much difficulty. The

only trees now in Aldabra are Casuarinas and Mangroves, the latter some of the largest I have ever seen, sometimes 18 inches in diameter and 50 to 60 feet high. Formerly "Porché" and "Rose-wood" grew to considerable size, as shown by the decaying stumps; now only small ones exist.

On the other hand *small* plants are remarkably scarce. Almost the entire vegetation consists of shrubs of from 3 to 7 feet in height. As soil is extremely scanty, and the droughts and heat excessive, this may account for the paucity of small plants. Almost the whole island, or rather islands, consist of bare fossil coral, with an extremely jagged and rugged surface, honeycombed with great pits and crevices into which the sea water finds its way at high tide. There are no orchids. The most conspicuous plant is a sort of Aloe (?), of which there are three *living* specimens in the box. There does not seem to be more than 35 indigenous plants, and most are represented in the collection which I sent you.

I visited many of the islands in these seas, Providence, Assumption, and Glorioso, but made no collections of plants, as my stay was too short. Glorioso seemed to be comparatively rich in species.

Hoping that the Aldabra box will reach you and prove of some interest,

I remain, &c.

Mr. Thiselton-Dyer,
Kew.

(Signed) W. L. Abbott.

CCCXVII.—DECADES KEWENSES.

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS V.

41. **Sterculia Murex**, *Hemsl.* [Sterculiaceæ]; foliis longe petiolatis digitatim 7-foliolatis, foliolis papyraceis vel subcoriaceis subsessilibus lanceolatis subacutis basi cuneatis utrinque venis elevatis minute reticulatis molliter stellato pubescentibus, venis primariis lateralibus numerosis supra medium plus minus distincte bifurcatis et inter se anastomosantibus, floribus . . . . fructus carpellis maximis brevissime stipitatis apice longe rostratis apertis fere hemisphæricis extus tota longe spinosis simul papillosis, papillis ferrugineo-stellato-pubescentibus, spinis validis rigidis curvatis inæquilongis vetustis saltem subobtusis, seminibus ut videtur 10 compresso-ovoideis vel ellipticis nigris, hilo parvo, testa crustacea, albumine ceroso.

Habitat.—Transvaal, South Africa, *Mr. J. Medley Wood*, 160 (1892) carpel and seed; 4710 (1893) two leaves.

Petiolus communis circiter semipedalis. *Foliola* 5–7-pollicaria. *Carpellum* apertum circiter 6 poll. diametro, spinis $\frac{1}{4}$–$1\frac{1}{2}$ poll. longis instructum. *Semina* circiter pollicaria.

This species is remarkable for its exceedingly large carpels, which are densely armed with long spines interspersed with shorter ones. Mr. Wood has promised to try to obtain flowers; meanwhile we do not hesitate to publish it from the foliage and fruit alone.

42. **Smithia (Kotschya) Carsoni**, *Baker* [Leguminosæ-Hedysareæ]; fruticosa, caulibus virgatis dense pubescentibus, foliis brevissime petiolatis, stipulis persistentibus coriaceis ovatis vel lanceolatis haud calcaratis, foliolis 8–10 jugis dimidiato-oblongis rigide coriaceis glabris mucronatis, racemis brevissimis 1–2 floris, pedicellis brevissimis, bracteolis lanceolatis hispidis, calyce hispido magno labio superiore oblanceolato-oblongo, inferiore profunde tripartito segmentis angustis infimo concavo, vexillo orbiculari quam calyx breviore, alis angustis, carinâ leviter incurvata, ovario pauciovulato dense pubescente, stylo longissimo.

Habitat.—Central Africa, on the plateau over Lake Tanganyika, *Carson.*

Folia 2–3 poll. longa, *foliolis* 5–6 lin. longis. *Calyx* 8–9 lin. longus. *Vexillum* 6 lin. longum, *alæ* et *carina* paulo breviores.

Allied to *S. Pfundii*, Schweinf., of Kordofan, and *S. Chamæcrista*, Benth., of Madagascar.

43. **Dizygotheca leptophylla**, *Hemsl.* [Araliaceæ]; glabra, caule simplici inermi, foliis radiato-digitatis longe petiolatis juvenilibus et ramulorum lateralium sterilium ab adultis valde dissimilis multo minoribus (unde nomen specificum "leptophyllum") foliolis sæpius 5–7 fere linearibus obsolete paucidenticulatis, petiolo petiolulisque gracillimis, foliis plantæ adultæ seu floriferæ amplissimis, foliolis 7–11 subcoriaceis longe petiolulatis oblongis obtusis basi rotundatis vel interdum subcuneatis integris insigniter undulatis subtus vix pallidioribus, costa subtus elevata, venis primariis lateralibus numerosis sat distinctis, petiolo maculato crasso fere tereti basi incrassato apice disciformi cum foliolis angulum rectum formantibus, floribus mediocribus verticillatim umbellato-paniculatis, umbellulis 5–10 floris, pedicellis gracilibus, bracteis bracteolisque per anthesin omnino carentibus, calyce truncato, petalis angustis vix acutis reflexis intus carinatis, staminibus 5, filamentis fere filiformibus quam petalis vix longioribus, antheris magnis 4-locularibus, ovario 10-loculare.—"*Sciadophyllum leptophyllum*," spec. cult. in herb. Kew; *Aralia leptophylla*, Veitch in Proc. R. Hort. Soc. Lond. 1862, p. 318; J. Makoy, Prix Cour. 1862, p. 5; Gard. Chron. xvii., 1882, p. 227.

Habitat.—Unknown, though it has been in cultivation upwards of 30 years.

Caulis plantæ hodie in horto Kewensi cultæ 6-pedalis, pollicem crassus. *Folia* juvenilia minora visa cum petiolo 8-pollicaria, petiolo foliola fere æquanti; *foliola* 4–5 lineas lata. *Folia* maxima plantæ Kewensis cum petiolo 26-pollicaria, lamina 20 poll. diametro; *petiolus* 16 poll. longus, 3 lineas crassus; *foliolum* maximum 9 poll. longum et 3 poll. latum; *petiolulum* 2-pollicare. *Inflorescentiæ* pars siccata in herb. Kew 10 poll. longa et lata; *pedicelli* circiter 5 lineas longi. *Flores* 3–4 lineas diametro. *Fructus* non visus.

Mr. R. I. Lynch, Curator of the University Botanic Garden, Cambridge, recently sent to Kew a flowering specimen of this old inhabitant of our gardens, with some remarks on the almost incredible diversity between the foliage of young plants and flowering plants; but having watched it through its various stages he could have no doubt about it. Looking through the herbarium I found a specimen that flowered at Kew previous to 1867. It is clearly a congener of the plant described

by Mr. Brown (*Kew Bulletin*, 1892, p. 197), under the name of *Dizygotheca Nilssoni*, and also, most likely, a native of Polynesia.

44. **Carpesium atkinsonianum**, *Hemsl.* [Compositæ-Inuloideæ]; humilis gracilis fere undique parce pubescens, caulibus simplicibus, foliis petiolatis membranaceis primum scaberulis lanceolatis v. inferioribus latioribus fere rotundatis acutis basi cuneatis minutissime remoteque calloso-denticulatis, capitulis parvis paucis pedunculatis foliis parvis (vel involucri bracteis foliaceis) sub capitula 1–3 vel interdum nullis, involucri bracteis pauciseriatis cito glabrescentibus coriaceis vel scarioso-coriaceis basi incrassatis oblongis apice rotundatis vel fere truncatis simul plus minusve irregulariter dentatis exterioribus gradatim brevioribus, floribus paucis, achæniis glabris angustissimis striatis breviter rostratis, rostro insigniter glutinoso-glandulifero, pappo nullo.

Habitat: Lofau mountains, Kwangtung, China, Mr. C. Ford, 317 (1892).

Caules 4–9 poll. alti. *Folia* maxima 3 poll. longa. *Capitula* 3-5 lineas diametro. *Achænia* circiter sesquilineam longa.

This plant is named after Dr. Atkinson, Superintendent of the Government Civil Hospital at Hongkong, a gentleman who has given Mr. C. Ford, the Superintendent of the Botanic Garden, all the aid he could in the botanical exploration of the neighbouring mainland.

45. **Calea (Eucalea) floribunda**, *Baker* [Compositæ-Helianthoideæ]; fruticosa, sarmentosa, ramulis parce pubescentibus, foliis petiolatis ovatis interdum cordatis obtusis crenatis subcoriaceis facie glabratis dorso pubescentibus venis exsculptis, capitulis paucifloris heterogamis radiatis perpluribus densissime corymbosis, pedunculis pubescentibus, involucro paucifloro infundibulari bracteis pauciseriatis imbricatis valde inæquilongis exterioribus parvis ovatis interioribus oblongis ciliatis, ligulis 2–3 patulis, pappi paleis paucis lanceolatis acuminatis inæqualibus.

Habitat.—Central Brazil, in the province of Minas Geraes, *Glaziou*, 19,542.

Folia inferiora 3 poll. longa. *Involucrum* 3 lin. longum, 1½ lin. diam. *Pappus* 1 lin. longus.

Allied to *C. solidaginea* and *prunifolia*, H. B. K.

46. **Pedicularis flaccida**, *Prain* [Scrophularineæ]; adscendens glabra, caulibus gracilibus corymbosim ramosis, foliis ramisque 3–4-natim verticillatis radicalibus mox evanescentibus caulinis breve petiolatis ovatis pinnatifidis segmentis 5–6-jugis obtusis inciso-serratis, floribus verticillis 4-floris paucis remotisque dispositis, bracteis foliaceis calycem excedentibus, calycis glaberrimi parvi campanulati antice parum fissi 5-dentati segmentis omnibus oblongis integris tubo costato nec fisso, corollæ tubo sursum ampliato calycem 3-plo excedente basi infracto, labio 3-lobo lobis lateralibus ovatis medio orbiculato basi constricto 3-plo majoribus galea leviter arcuata tubo subcontinua apice subincurva erostri, staminibus ex adverso medii ovarii insertis filamentis omnibus glaberrimis, antheris contiguis muticis, ovario ovoideo stigmate exserto.

Habitat.—Western China, in the Mountains of Szechuen, *Pratt*, 471.

Nearly related to *P. verticillata*, L. and *P. refracta*, Maxim., differing from the former in having contiguous anthers, and a distinctly toothed calyx, and from the latter in having the calyx tube not costate between the ribs, the calyx teeth entire, and the anther cells muticous. From *P. verticillata* it also differs in foliage; from both it differs in habit, in having the calyx much smaller, and in having perfectly glabrous filaments.

47. **Euphorbia Sipolisii**, *N. E. Brown* [Euphorbiaceæ]; caulibus carnosis ramosis acute tetragonis articulatis aphyllis glabris, cymis sessilibus lateralibus terminalibusque paucifloris, involucro basi 1–3 bracteato campanulato glabro 5–6-lobo lobis subquadratis fimbriatis, glandulis transverse oblongis angulis vix producuis, fructu longe pedicellato reflexo glabro subgloboso tricocco.

Habitat.—Brazil, *Glaziou.*

Rami 4 lin. diam. *Involucra* 2–2½ lin. diam.

This is a very distinct species belonging to the section *Euphorbium*, of which it makes the second at present discovered in Brazil. It was received in a collection of plants made chiefly in the province of Minas Geraes, and sent to Kew by Dr. A. Glaziou in 1892, but the specimen was unaccompanied by any precise locality. It is dedicated to the Abbé Michel Marie Sipolis, Director of the Seminary of Diamantina, who has rendered many services to science in general.

48. **Syringodea Flanagani**, *Baker* [Irideæ]; cormo parvo tunicis brunneis membranaceis, foliis 6–9 filiformibus glabris, perianthii tubo luteo cylindrico spathâ duplo longiore, segmentis pulchre rubro-purpureis exterioribus oblanceolatis interioribus oblanceolato-oblongis, staminibus limbo distincte brevioribus.

Habitat.—Cape Colony: province of Albany, on the summit of Gourlie Hill, near Kongha, alt. 2,400 feet, *Flanagan*, 720.

Cormus 3 lin. diam. *Folia* 1–2 poll. longa. *Spatha* 6–9 lin. longa. *Perianthii limbus* 4 lin. longus.

This interesting new species of the genus that represents *Crocus* at the Cape has recently been received from Professor McOwan.

49. **Kniphofia zombensis**, *Baker* [Liliaceæ]; foliis paucis ensiformibus pedalibus vel sesquipedalibus haud acuminatis erectis flaccidis marginibus incrassatis lævibus, pedunculo stricto subvalido foliis eminente, racemo denso oblongo, pedicellis brevissimis, bracteis magnis lanceolatis acuminatis scariosis niveis distincte brunneo-carinatis, perianthio subcylindrico vix policari e medio ad basin sensim angustato, lobis latis brevissimis, staminibus inclusis, stylo exserto.

Habitat.—Mount Zomba, Shiré highlands, *Buchanan*, 664.

Folia deorsum 6–9 lin. lata, sursum sensim attenuata. *Racemus* 3–4 poll. longus, bracteis inferioribus 5–6 lin. longis. *Perianthium* 2 lin. diametro.

A very distinct species with the general habit of *K. aloides*, but having only a few broad, comparatively short and flat leaves, different bracts and a differently shaped perianth.

50. **Kniphofia longistyla**, *Baker* [Liliaceæ]; caule basi incrassato, fibris radicalibus perpluribus tenuibus, foliis radicalibus pluribus linearibus sesquipedalibus marginibus lævibus, pedunculo foliis longiore, racemo denso oblongo, pedicellis brevissimis, bracteis oblongis, perianthio cylindrico pollicari lobis parvis ovatis obtusis, staminibus perianthio æquilongis, stylo longe exserto.

Habitat.—Shiré highlands, *Buchanan.*

Folia deorsum 3–4 lin. lata, sursum sensim attenuata. *Racemus* bipollicaris, bracteis inferioribus 3 lin. longis. *Perianthium* 1 lin. diam. *Stylus* 3–4 lin. exsertus.

Habit and foliage of *K. pumila* and *K. Tuckii*, but flowers very different.

CCCXVIII.—PARA RUBBER IN CEYLON.

As stated in the *Kew Report* for 1876, p. 8, Mr. H. A. Wickham, a resident on the Amazon, was commissioned by the India Office to collect seeds of *Hevea brasiliensis*. He arrived in England on June 14th with 70,000 seeds obtained on the Rio Tapajos, and on August 12th following, about 2,000 plants raised at Kew from these seeds were despatched to Ceylon in 38 Wardian cases. Ninety per cent. of the plants reached their destination in perfect condition. A further consignment of 100 plants was sent in 1877, making the total number of plants transmitted to Ceylon 2,119 (*Kew Report*, 1877, p. 15).

The following correspondence gives the first result of the experiment which affords anything like commercial data for deciding whether the cultivation of this staple would be a paying enterprise in the Old World :—

DR. TRIMEN to ROYAL GARDENS, KEW.

[Received February 6th, 1893.]

India-rubber (2 lb.) from *Hevea brasiliensis* grown in Heneratgoda Botanic Garden, Ceylon, in 1892.

The tree from which this was obtained is now 15 years old, and the stem has a circumference of 6 ft. 5 in. at a yard above the ground.

It has now been tapped three times, and has given the following yield :—

In 1888 it gave 1 lb. $11\frac{3}{4}$ oz.
„ 1890 „ 2 lb. 10 oz.
„ 1892 „ 2 lb. 13 oz.

Making a total of 7 lb. $2\frac{3}{4}$ oz. of dry rubber in five years.

The tree is in no respect the worse for this treatment; the rest in alternate years permitting the scars on the trunk to become completely healed.

(Signed) HENRY TRIMEN.

MESSRS. HECHT, LEVIS, & KAHN to ROYAL GARDENS, KEW.

21, Mincing Lane, London, E.C.
7th February, 1893.

DEAR SIR,

WE have received your yesterday's letter, and also the sample of Ceylon rubber which you have sent to us. The quality of this rubber is very good indeed, and the curing of the same seems to have been effected in the proper manner. This quality would be easily saleable, and we estimate its value to-day as being about 2*s*. 3*d*. to 2*s*. 6*d*. per lb., according to whether the rubber would be dry or damp. It would be easily saleable in *large quantities*.

We return the sample to you, according to your desire.

We remain, &c.

(Signed) HECHT, LEVIS, & KAHN.

John R. Jackson, Esq.,
Royal Gardens, Kew.

CCCXIX.—GOLD COAST BOTANICAL STATION.

The interesting Botanical Station established under the auspices of Sir W. Brandford Griffith, K.C.M.G., at Aburi on the Gold Coast has already been noticed (*Kew Bulletin*, 1891, p. 169; 1892, pp. 14 and 297).

In the present note, embracing communications received at Kew from the Secretary of State for the Colonies, only the indirect results of the Station are discussed. These have, however, so important a bearing upon the health and well-being of Europeans on the West Coast of Africa that they deserve to be more widely known.

COLONIAL OFFICE to ROYAL GARDENS, KEW.

SIR, Downing Street, 9th June, 1893.

I AM directed by the Secretary of State for the Colonies to transmit to you for your information, the enclosed copy of a despatch from the Gold Coast Colony regarding the excellent condition and beneficial effects of the Sanatarium at Aburi.

I am, &c.
(Signed) R. H. MEADE.

The Director, Royal Gardens, Kew.

Government House, Aburi Hills Station,
MY LORD, April 28, 1893.

ABOUT the middle of March, Dr. Easmon, the Acting Chief Medical Officer, whose health had become somewhat impaired by overwork, requested my permission to come to this Station to recruit. He remained for a fortnight, and on his return to Accra addressed a letter to the Colonial Secretary, copy of which I have the honour to transmit herewith, as it will afford your Lordship some idea of the salubrity of this Hill Station and of the change which has taken place at Aburi since 1890, with regard to which Dr. Easmon expresses himself in such rapturous terms.

2. Ten days after my return from England in February 1890, I came to this Station to reside for six weeks with the object of starting the new Botanical Station, having brought with me from Monrovia, where my steamer stopped, a dozen intelligent English-speaking Liberians who had been accustomed to the planting and treatment of coffee trees. I also employed about 30 men and utilised my Hausa escort, and in this way I had seven acres of land cleared of forest trees, and of the undergrowth of smaller ones and scrub, in three weeks, grubbing up the roots on a few acres and having them prepared for planting. The land originally cleared around the house was only one acre.

3. Mr. Crowther, the Curator, arrived on the 16th of March. On the 23rd I handed over the Station to him, and he commenced to clear the remaining 19 acres of land. Subsequently 16 acres were purchased. Mr. Crowther set to work to clear these, and at present most of the cleared ground has been planted with coffee trees, grown from seed imported from Liberia, which are growing with extraordinary luxuriance and vigour while many of them are already producing berries. Other portions are planted with a very superior description of coffee, plants of which were brought from Jamaica and Santa Cruz in the West Indies a great many years ago, the berries yielding a delicious beverage, and in cocoa, from beans procured from Trinidad and Fernando Po. Both the native Coffee and Cocoa are already bearing, and in this regard it is

worthy of remark in what a short time coffee and cocoa begin to give a return in this Colony. In two years and a half after planting many of the trees commence blossoming and in due season yield an abundance of produce. Part of the land is devoted to growing fruit and vegetables, and the cleared unused portions are being gradually planted up with coffee and cocoa, seedlings remaining in excess of the quantities grown for sale and unapplied for, although large quantities have been sold to the public. The Station is partly surrounded by 300 young cocoanut trees which are growing vigorously, and by about an equal number of the Royal Palm, (*Oreodoxa regia*) a magnificent tree, seeds of which were imported from the West Indies.

4. The result of clearing the land of all valueless or unimportant forest trees and of the undergrowth has been not only to increase the ventilation of the station, but to make it distinctly cooler and healthier, whilst affording, by the removal of obstructing trees, a view of the coast line from Pram Pram to the lagoon West of Accra, the buildings of which are visible without the aid of glasses, with which steamers can be seen when at anchor in the roadstead or passing on. The entire land of the station is well laid out and intersected by excellent pathways and roads, whilst the portion immediately surrounding the house presents the appearance of a well-kept English garden.

5. I speak from experience of what I have seen of officers when they have left Accra for Aburi, and on their return to headquarters, when I state there can be no doubt that an invalid or anyone in reduced health coming to Aburi and remaining for a few weeks picks up marvellously in health, and presents the appearance of a person fresh from England.

6. The repairs to the house have not yet been completed owing to the difficulty of getting native timber for the purpose in the neighbourhood, a difficulty which, I hope, will soon be overcome, as there is discomfort in occupying some of the rooms, the floors and ceilings of which require to be put in good order.

I have, &c.
(Signed) W. Brandford Griffith,
Governor.

The Most Honourable,
the Marquess of Ripon, K.G.

Copy of a Letter from the Acting Chief Medical Officer to the Colonial Secretary, dated 3rd April 1893.

Sir,

I have the honour to report, for the information of His Excellency the Governor, my return to Accra from the Sanatarium at Aburi at 5.30 a.m. this day after a fortnight's absence for the benefit of my health.

I think it is only fair to record my grateful experience of the improvement in my health induced by the change, and I do this all the more to emphasise the fact which several years ago I observed and reported, viz.: the very great usefulness of the Aburi Sanatarium. I have within the last 10 years sent several patients to this sanatarium, official and unofficial, and in almost every instance the benefit derived has been most satisfactory.

The Aburi of to-day, however, is quite a different place from the Aburi of 10 years ago. It was a dreary enough place for an invalid to find himself in, almost hemmed in by bush, and often without a companion to solace him. Now the telephone places the patient in communication with his medical adviser at Accra; he is received on his arrival at Aburi

by the courteous and sympathetic curator, Mr. Crowther, whose healthy appearance and genial welcome suffice to re-assure him that improvement in his health will soon be accomplished, whilst on every side the eye feasts on the charms of a scientifically laid out and cultivated garden such as can be seen nowhere else in the Colony; here, a noble avenue of stately orange trees, the delicate aroma of whose blossoms perfumes the air; there, avenue of graceful spondias nodding their leaf-laden branches to the bracing breezes that sweep from over the Akim hills. These, intersected by floral walks and avenues of citrons and oranges, the interspaces thus formed being occupied, here with cacao plants, there with native coffee plants, and elsewhere with Liberian coffee trees; while just in front of the house, neatly arranged rows of beds are covered with flowers of all varieties and shades of colour. The whole thing is so different from what obtains in Accra: the great elevation above the sea, the soft, cool, refreshing breezes, the nights of profound sleep and rest. These are the claims of Aburi as a sanatarium, and only those who have suffered from the sleeplessness of the surf-bound coast towns can realise at its fullest worth the importance of the last of these.

The invalid furniture recently supplied is, indeed, a great boon to the invalids, and is money well spent. The crockery, cutlery, and kitchen utensils and table and bed linen require some attention.

I think I ought to add that during my visit there were at least six invalids resident in the Basal Mission Sanatarium, five Germans, and one an Englishman. And in the town there were several natives of Accra, some of them my private patients, who were recruiting their health at the station. In addition, three European and several native officials and many other private individuals went up for the Easter holidays, an event quite unprecedented in the annals of Aburi.

In conclusion, I beg to record my grateful appreciation of the unremitting and thoughtful kindness of Mr. Crowther to myself and the other invalids at the sanatarium.

I have, &c.

(Signed) J. Farrell Easmon,
Acting Chief Medical Officer.

CCCXX.—HORTICULTURE IN BELGIUM.

With the permission of the First Commissioner of Her Majesty's Works and Public Buildings, the Curator of the Royal Gardens, Mr. George Nicholson, A.L.S., was sent to Belgium for the purpose of attending the Thirteenth International Quinquennial Horticultural Exhibition at Ghent (April 16–23) and of visiting the more important horticultural establishments. The following notes give his impressions of the present position of gardening enterprise in Belgium:—

Belgium is a great horticultural country, and Ghent itself one of the busiest and most important centres of gardening on the continent. Nurseries, many of them of very considerable extent, exist by the hundred in its immediate neighbourhood. Owing to various causes, cheap glass, cheap labour, &c., many plants are grown for trade purposes on an enormous scale and exported to other European countries at a less price than they could be grown by the persons who import them. Azaleas are a case in point. That splendid specimens of Azaleas can be

grown in this country is evident enough to anyone familiar with our great flower shows, but that beautiful bushy market plants can be produced in the same time and at the same cost as those exported from Belgium is, I believe, impossible. The continental summer allows these to be planted out in beds in the open air, and causes the wood to be thoroughly ripened and the buds to set in a way which cannot obtain with us except in exceptionally favourable seasons. On the other hand, our moister cooler summers enable English gardeners to surpass their continental colleagues with such plants as *Nepenthes*, Ferns, Heaths, and many hard-wooded plants.

Fashion in horticulture changes in a somewhat arbitrary way, and no one can escape this conclusion by even reading the reports of the exhibitions of less than 20 years ago and those of to-day. Then new plants and collections were much valued, and nurserymen kept for sale large collections of stove and greenhouse plants, which now are hardly to be found outside a botanic garden. Even Camellias, which less than a generation ago were very extensively grown about Ghent, are now not to be seen in some establishments where once they were the principal stock in trade; apparently the difficulty in arranging the cut flowers and the impracticability of cutting largely from the plants is the cause of the disfavour into which they have fallen. New plants too, in the sense of collections of species, are almost ignored in many places, and instead enormous numbers of ornamental foliage and flowering plants, belonging sometimes to not more than a score of species, not unfrequently a much less number, are now to be seen.

The International Quinquennial Exhibition is the 13th of the series and the 159th flower show organised by the "La Société Royale d'Agriculture et de Botanique" of Ghent. The society was first formed in 1808, and its first exhibition was held in a room of a small inn in 1809 about 100 yards from the site of its present quarters; a reproduction of this first exhibition as regards the room, &c., and as far as possible the species and varieties of plants was one of the most interesting features of the Quinquennial of 1888.

From 1837 exhibitions were held in a large permanent building, but in 1878 temporary structures more vast each succeeding "quinquennial" were built in the grounds. This year one structure admirably built, designed by M. Ed. Pynaert covered a space of more than 2,500 square metres; and arrangements for heating were made so that, had the weather proved cold, the plants contained in it would have been perfectly safe.

Subsidies from the Belgian Government, the Province, the town of Ghent and the subscriptions of the members of the Society furnish the large sum of money necessary to carry out an exhibition on so vast a scale. No entry fees are paid by exhibitors, and the Society makes arrangements with the railway and steamship companies for low freight charges. This year the entries were more numerous than ever, some even were refused for want of space—and some groups of plants which otherwise would have been under cover were placed for effective masses in the open garden. The jury consisting of 184 members, belonging to 15 nationalities, including Russia, Brazil, and Japan, divided into sections had to judge about 660 classes.

The Great Hall, a glass-roofed structure, with an area of 2,200 square metres, was so arranged as to produce a wonderfully fine effect. Large palms, tree-ferns, &c. were massed irregularly round outer walls and at the foot of the double staircase leading to the upper rooms of the casino. A main curving walk went round the building in front of these

tall banks of foliage. Eight masses of dwarfer growing plants were arranged in the centre of the hall with a broad central walk and shorter ones leading into the main arteries.

The palms were especially well-grown, large specimens in splendid health in small tubs and pots. Careful attention to watering, and especially in the application of liquid manure, enable the growers to produce beautiful specimens of great size, which can be moved about with comparative ease. Some years ago collections of palms were grown for sale by some of the principal Belgian nurserymen ; now house after house of a single species or of a very few of those best adapted for decorative work, are to be met with, and the rarer kinds of less value from a "furnishing" point of view have almost entirely disappeared. *Kentia*, *Phœnix*, *Cocos*, and *Livistona* are the genera now most frequently represented in nurseries, but in the exhibition a number of fine specimens of *Washingtonia* and *Erythea* (imported from the Riviera), *Thrinax*, *Sabal*, *Rhapis*, *Pritchardia*, *Seaforthia*, &c. were to be seen.

In the centre of the great hall, huge specimen Azaleas were so thickly covered with flowers as to hide the leaves. Although in shape the plants were extremely formal, they showed exceptional skill in cultivation. There must have been considerable trouble taken in "keeping back" plants which under any ordinary conditions in such a season as the present would have been quite out of flower before the exhibition opened. We heard of one exhibitor placing blocks of ice in his Azalea house in order to keep down the temperature. Careful shading—in some cases moving plants into dark sheds, &c.—was also resorted to. Some of the Aroids exhibited were exceptionally fine ; a grander lot of *Anthurium scherzerianum* than that exhibited by M. G. Warocqué was probably never before seen ; the specimens were very large, healthy, and with extraordinarily large inflorescences. The ornamental foliage Aroids were also well represented ; these plants are more widely grown as stove decorative plants in Belgium and other continental countries than in Britain. Ferns, with the exception of tree-ferns, which were well shown, were not remarkable ; much better groups as regards cultivation and variety are to be seen at any of the large London shows.

Cycads were good and attracted much attention, but they were decidedly inferior, for instance, to those in cultivation in the Palm House at Kew. Fine plants of Caladiums were exhibited in great variety by M. Louis Van Houtte.

The Norfolk Island Pine, *Araucaria excelsa*, and a number of garden varieties of it were exhibited in the most perfect condition ; in and around Ghent whole series of houses in many establishments are devoted to the cultivation of this conifer. It is one of the most popular plants for table and conservatory decoration.

In the Central Hall of the Rotunda were exhibited two very wonderful groups of orchids containing many rare choice and valuable varieties of well-known species, and not a few well-grown plants of rare species beautifully flowered. The two exhibitors were MM. J. Hye and G. Warocqué, both Belgian amateurs.

A collection, said to contain 228 distinct species, many of them uncommon, was exhibited by M. Alfred Van Imschoot ; amongst them was a *Vanilla* in fruit.

Both at the exhibition and in many of the nurseries visited, the English visitor could not help being struck by the health and vigour of Cattleyas, Odontoglossums, Miltonias, and other orchids. Whether the extreme vigour of the plants conduces to longevity (many orchids are short lived under cultivation) is a question which many would like to see definitely settled. As a rule a much higher temperature is main-

tained in the houses than is considered good for the same species under cultivation in English orchid houses.

Canvas is not used in Belgium as a shading material, but thin laths or bamboo strips wired together and drawn up or let down by means of rollers, as are the canvas blinds in England. As a consequence during sunlight the orchid leaves are barred transversely with bands of light and shade quite different from the more diffused light caused by canvas. I cannot but think that this may have something to do with the success which attends the cultivation of Cattleyas, Odontoglossums, &c. in Belgium.

No thrips or other insect pest infested any of the numerous sets of plants seen; on inquiry this was attributed to a layer of the midribs of tobacco leaves placed on the hot water pipes; fumigation was not resorted to.

In the class for New Plants Messrs. Sander & Co., St. Albans, exhibited *Dracœna sanderiana*, a distinct plant with elegant yellow and green leaves, from the Cameroon Mountains; *D. godseffiana* from the Gold Coast, remarkable for its prettily spotted foliage and an ally of *D. surculosa*; *Ludovia crenifolia*, a Carludovica-like plant from Tropical America; *Alocasia watsoniana* from Sumatra; *Alsophila atrovirens*, a beautiful tree fern from South America, and *Strobilanthes dyerianus*, an East Indian Acanthad with brilliant purple-red leaves and erect spikes of blue flowers. L'Horticulture Internationale, Brussels (M. Linden). showed *Eulophiella Elizabethæ* from Madagascar, a new genus of orchids, with large beautiful flowers; *Tradescantia Reginæ* and *T. superba*, beautiful tropical ornamental-leaved species; *Smilax argyræa*, a small elegant-leaved climber mottled with silvery grey; *Hæmanthus Lindeni*, a handsome plant with a head of brilliant crimson flowers not unlike *H. multiflorus*, and *Begonia Lansbergiæ*, a noble plant with large emerald green hairy leaves.

The Hippeastrums shown by Messrs. James Veitch & Sons, Chelsea, were remarkably fine, much better than those of any other exhibitor. The *Nepenthes* exhibited by M. Alex. Dallière of Ghent were much inferior to the plants we are accustomed to see in English gardens. In spite of the season—all hyacinths grown in the open air had long been past—one room was resplendent with remarkably fine pot hyacinths contributed by several Dutch growers.

The new Bertolonias exhibited by Van Houtte attracted much attention; it is impossible to describe the delicacy as well as the brilliancy of their foliage.

Saintpaulia ionantha, a gesneraceous plant with a rosette of radical leaves and short scapes, bearing deep violet blue, yellow-anthered flowers, was one of the prettiest as well as one of the most interesting new plants exhibited. Seeds of it were sent home by the German officer (in whose honour it has been named) from the mountains of Eastern Tropical Africa. In general aspect the plant resembles *Ramondia pyrenaica*.

In British gardens, Bromeliads have not yet acquired the position to which they are entitled as ornamental plants; many of them are very handsome and their strangely marbled leaves and brilliantly-coloured inflorescences, which often last a long time, make them popular on the continent for decorative purposes. Many thousands of one species alone—beautifully grown plants—were seen in the Royal Gardens at Laeken, where Mr. Knight uses them with great effect. At the exhibition were to be seen many fine hybrids; some of the best were those shown by M. Duval of Versailles, under the names of *Vriesea tessellata*, *splendens*, and its varieties *major* and *minor*. Other very fine Bromeliads were exhibited by the Botanic Garden at Liège—for so many years

famous for its collections of this family of plants,—by MM. Jacob Makoy & Co., and by M. J. Moens.

Crotons I have seen much better shown in England.

In the large annexe beautiful colour effects were produced by masses of *Azalea mollis*, Rhododendrons shown in fine variety by M. Pynaert, *Azalea indica*, *Clivia miniata*, vars., &c. One of the most successful efforts in the way of plant cultivation I have ever seen were the oranges *Citrus sinensis*) from M. Gulinck and M. Alexis Dallière; the plants were fine bushes and pyramids, 2 to 3 feet high, laden with well coloured fruits.

Kalmia latifolia, dense, compact bushes covered with flowers, were exhibited in quantity; a more elegant pot plant could scarcely be imagined than this as grown at Ghent.

The Sweet Bay (*Laurus nobilis*) is cultivated in some establishments near Ghent and elsewhere in Belgium by the acre. They are grown in tubs as round-headed bushes on stems or as pyramids, and as specimens, showing great skill on the part of the grower, they leave nothing to be desired. During winter the plants must be housed; they require so long a time to attain a marketable size and so much care to bring them to such a state of perfection that they are much too valuable to risk outside during winter.

Choisya ternata was well grown and flowered. Some specimens had hemispherical heads, on stems 2 feet high, covered with blossoms. *Cytisus scoparius*, var. *andreanus*, was also exhibited, grown in a similar way.

Diervilla (or *Weigela*), Eva Ratke, is a handsome variety with deep red flowers; it was finely exhibited by M. Pynaert, and will doubtless be cultivated by all who love hardy shrubs.

At Laeken a bronzy yellow tea rose, William Morley, is grown under glass for cutting, and is preferred to Maréchal Niel, as it is not so liable to canker as that variety. Standard hybrid perpetual roses and dwarf moss roses were largely grown in pots and well done. In a bed in one of the large conservatories a fine mass of *Strelitzia Reginæ* was in flower; it was planted out; the temperature in winter was kept up to 15°–16° Centigrade (say 60° Fahrenheit). Amongst other striking plants planted out at Laeken are Clavijas, Bromeliads, *Chamærops stauracantha*—a remarkably fine specimen,—*Kentia Lindeni*, and other rare palms. Brunfelsias in fine flower produced beautiful effects as bushes planted out.

Large plants of *Vanda tricolor*, &c., grown elsewhere and brought into the large warm conservatory to flower, were models of good cultivation. A number of small bushes—not a foot high, in six-inch pots—of *Medinilla magnifica* bore as many as half a dozen fine inflorescences; these must have been raised from large cuttings taken from old plants after growth had been made and bloom buds more or less formed. In any case the Medinillas were a triumph of gardening skill.

One of the great features in the spring months at Laeken is the great extent of corridor connecting the different groups of houses with the palace and with each other. There are about 1,200 yards of corridor, and in mid April it was a blaze of flower. Tropæolums, ivy-leaved and zonal Pelargoniums, *Abutilon megapotamicum* (*A. vexillarium*), which was also used with considerable effect as a basket plant, Passion flowers, Heliotropes, Jasmines, the true *Acacia riceana*, *Rhodochiton volubile*, *Dolichos*, Bignonias, and other plants being trained up the side and roofs.

Columbines were largely grown as pot plants for decorative furnishing, and remarkably fine they were.

G. N.

CCCXXI.—ECONOMIC PLANTS OF SIERRA LEONE.

A report on the botany and geology of the district of Sierra Leone traversed by the Anglo-French Boundary Commission in 1892 has lately been issued by the Colonial Office. It is prepared by Mr. G. F. Scott Elliot, F.L.S., the botanist to the Commission, with notes on the geology by Miss Catharine A. Raisin, B. Sc. of University College.

From the botanical portion of the report the following references to the economic plants of Sierra Leone are of interest. It may be remembered that an account of the fruit productions of Sierra Leone was given in the *Kew Bulletin*, 1888, p. 221 :—

Coffee.

Coffee was discovered wild at Sierra Leone so long ago as 1796 by Mr. A. Moore. At present there are two different species cultivated by the natives, and these require different treatment.

Coffea stenophylla.—The narrow-leaved "wild," "bush," or "native coffee," is sometimes found wild in the hills, and is more often cultivated by the natives than the Liberian. It grows very freely, and appears to yield quite as much as the Liberian, but it is somewhat longer in coming into bearing. Both the natives and French traders at Freetown say that it has a superior flavour, and prefer it to the Liberian. In fact, latterly, a certain amount has been exported to a wholesale French dealer, who is said to sell it at 4 francs 50 centimes a lb. as "best Mocha." Considering that it is worth in Freetown about 6*d.* a lb., this should be a fairly profitable trade, and a trial shipment should be made by the English merchants to find out exactly what the market value in Liverpool would be. The plant appears to thrive best on the higher hills about Sierra Leone, on gneissose or granitic soil, and can be grown from 500 to 2,000 feet. Probably it may be grown both above and below these limits.

Coffea liberica.—There is no doubt that the cultivation of this coffee is extremely profitable in the Sierra Leone district. There is one well established plantation, and bushes may constantly be seen in native enclosures. The Hon. S. Lewis was kind enough to show me over his plantation at Christiansville, which probably contains some 70,000 trees, and gave me every information with regard to it. It was commenced in 1883, and of course was in its initial stages both extremely expensive and disappointing. Now, however, Mr. Lewis thinks he has advanced beyond the experimental stage, and he certainly seems to be gaining the reward which his enterprise and perseverance so well deserve.

Rubber.

The amount of rubber available from the rubber-vines of West Africa (species of *Landolphia*) depends on the amount of original forest, and this is not large in the district we traversed. On the other hand, there are enormous areas from which rubber could be obtained,

provided the district was freed from the never-ceasing native wars and slave-raiding expeditions. Thus the country about Laya and Kofiu mountain, as well as the Benna country, along the edge of which we passed, is full of forests, and contains much rubber which would, if the roads to Kambia were safe, pass down the Scarcies River. The Fula country, lying back from the north-west corner of the English sphere of influence, is also said to be full of rubber, which would most probably come down the same way. Along the 10th degree of north latitude the country is in many places broken and mountainous, and the deeper and narrower valleys are full of dense forest (too far from a market for timber to be exported), but from which the rubber could be profitably withdrawn. There is also in all probability an enormous supply in the almost uninhabited Koronko district, and in the magnificent woody valleys about Bafodeya and other parts of the Limba country, on the Upper Rokelle, and especially in the back country of Sherboro. I should think it probable that with roads made absolutely safe the supply of rubber from the colony might be doubled or even quadrupled in amount, but with the development of lawlessness and the constant native wars everywhere, but little is to be expected after the next few years, when the sources readily reached from the coast have been drained of their supplies. It must also be remembered that the supply is one which is likely to be exhausted with increase of population, and ought not to be reckoned upon for more than a few years, supposing the country *were* rendered safe.

Oil Palm.

The export of palm oil and kernels forms by far the largest part of the West African Export Trade. The following figures are given by the *Sierra Leone Gazette*:—

——	1888.	1889.	1890.
	£	£	£
Palm oil - - -	12,285	11,379	13,599
Palm kernels - -	97,177	105,963	107,827

The tree is more abundant further down the West African coast, and appears to prefer alluvial, often marshy, ground near the sea. It particularly seems to thrive on the rich soil of the mangrove accumulations. There are large numbers of these trees in the Mahela district, where a factory once existed, and there are also a considerable number up the Scarcies river, and in the lower part of the Limba district. It grows also on low sandstone or gneissose hills, but probably does not produce so much in such places as on the low lying rich alluvials. The palm is propagated from the offshoots that appear at its base, and these are said to begin to bear in the second or fifth year, and are in full bearing about the 10th to 15th year; they continue producing for 60 years.

A single tree yields from 1 to 3 gallons of palm oil. This would be a profit of from 2*s*. to 6*s*. a tree per annum. The palms require no care, and are not, apparently, attacked by any injurious insects.

The preparation of the oil is of a very rough and makeshift character; the fruits are thrown into a tank and left till decomposition begins; they are then boiled, and afterwards pounded in a mortar. Probably 25 per cent. of the oil is lost in preparation.

Pine Apple.

This plant is almost wild in many places, and seems to grow wherever placed without the least attention. We found it common about Sierra Leone, and again along the Scarcies, and even as far up country as Falaba. It grows as a rule on the laterite and ironpan hills, but it is said that if planted on good alluvium very large fruits can be obtained with a little attention. This must, however, be neither too stiff, so as to hold water, nor of too sandy and dry a character. They should be planted out from off-shoots at from three to four feet distances at the beginning of the rains, and they ripen in 14 to 20 months. Development from seed takes 10 to 12 years. The price of the present small and inferior kind sold at Sierra Leone varies from $\frac{1}{2}d.$ to $1\frac{1}{2}d.$ each. This fruit is one of the most important if an export trade is ever formed.

Bamboo.

The mountains about the upper waters of the Scarcies rivers and also at Falaba, produce an abundance of bamboos [probably species of *Oxytenanthera*] usually about 20 feet high and 3 inches diameter. These are, as a rule, hollow stemmed, but are of considerable strength and used locally for many purposes. The quantity available is enormous, but probably being nearly 300 miles from the coast it is impossible to have them brought to market. They grow on mountain sides and usually kill out every other plant, and they seem to prefer dry rocky ground. The only specimen in flower which I saw is too poor for determination, but it is almost certainly a new species of Bambusa.

Cotton Seed.

No attempt has been made to utilise the enormous amount of cotton seed which must be annually thrown away at Sierra Leone. The supply would be enormous if the seeds could be profitably exported, as the plant is grown in almost every village.

CCCXXII.—NEW ORCHIDS: DECADE 6.

51. **Pleurothallis puberula**, *Rolfe;* caulibus teretibus elongatis, foliis elliptico-oblongis obtusis brevissime bidentatis basi attenuatis, spatha conduplicata carinata submembranacea, racemis elongatis multifloris, floribus subdistichis, bracteis tubulosis truncatis, sepalis lineari-lanceolatis acutis puberulis, petalis obovato-oblongis truncatis v. retusis, labello recurvo subpandurato-oblongo apice obtuso subrevoluto medio bicarinato, columna alata.

Hab.—Not recorded.

Caules 6 poll. longi, vel fortasse interdum ultra. *Folia* 6–7 poll. longa, $2\frac{1}{4}$–$2\frac{1}{2}$ poll. lata; *petiolus* 1 poll longus. *Spatha* 9 lin. longa. *Racemi* 3–5 poll. longi. *Bracteæ* $\frac{3}{4}$–1 lin. longæ. *Pedicelli* 2 lin. longi. *Sepala* $2\frac{1}{2}$–3 lin. longa. *Petala* 1–$1\frac{1}{4}$ lin. longa. *Labellum* $\frac{3}{4}$ lin. longum.

This species belongs to the section *Spathaceæ*, and is allied to the West Indian *P. univaginata*, Lindl., but its flowers are smaller and

more densely arranged on the raceme. It was sent for determination by Mr. F. W. Moore, Keeper, Royal Botanic Garden, Glasnevin, in January 1892, and again early in the present year. The flowers are pale green with a little dull yellow at the base, and exhale a hawthorn-like fragrance. The upper half of each sepal is finely pubescent.

52. **Bulbophyllum spathaceum**, *Rolfe*; rhizomate repente radicante valido epseudobulboso, foliis petiolatis lineari-oblongis obtusis, scapis erectis brevibus basi spathaceis, racemis cylindraceis parvifloris multifloris, bracteis lanceolatis acuminatis, sepalo postico lanceolato-lineari subacuto lateralibus triangulo-lanceolatis acutis postico latioribus, petalis linearibus obtusis, labello recurvo integro lineari-oblongo obtuso subcarnoso, columna brevissima dentibus brevibus.

Hab.—Burma, Shan States.

Folia 3½ poll. longa, 1 poll. lata; *petiolus* 1 poll. longus. *Scapi* 4 lin. longi. *Bracteæ* 1½–2½ lin. longæ. *Pedicelli* 1–1½ lin. longi. *Sepala* 1½ lin. longa. *Petala* 1 lin. longa. *Labellum* 1 lin. longum.

This species was introduced by Messrs. Hugh Low & Co., of Clapton, and flowered with Mr. James O'Brien, of Harrow-on-the-Hill, Middlesex, in July 1892, when it was sent to Kew for determination. It is allied to *B. apodum*, Hook. f. "Flora of British India," v. p. 766, but has shorter leaves, and a much denser raceme, and much more slender membranaceous bracts. The flowers are light straw yellow, with a somewhat brighter lip. The base of the inflorescence is sheathed by spathaceous bracts, in allusion to which the name is given.

53. **Bulbophyllum viride**, *Rolfe*; rhizomate repente gracili, pseudobulbis ovoideis subcompressis monophyllis, foliis subsessilibus lineari-oblongis subobtusis, scapis gracilibus paucifloris foliis saltem duplo longioribus bracteis ovato-oblongis breviter acuminatis, sepalis subpatentibus lanceolato-ovatis acuminatis, petalis ellipticis minute apiculatis subconcavis, labello recurvo integro oblongo subobtuso ciliato subcarnoso infra medium canaliculato, columna brevi dentibus subulatis incurvis.

Hab.—W. Trop. Africa.

Pseudobulbi 2–4 lin. longi. *Folia* ½–1 poll. longa, 1½–3 lin. lata. *Scapi* 2–3½ poll. longi. *Bracteæ* 1 lin. longæ. *Sepala* 2½ lin. longa. *Petala* 1 lin. longa. *Labellum* 1½ lin. longum.

This small species was sent to Kew for determination by Philip Crowley, Esq., Waddon House, Croydon, in December 1890. A plant presented to the Kew collection has since flowered on two or three occasions. It is allied to *B. interteætum*, Lindl., from the same region. The flowers are wholly light green, except for the presence of a pair of small dull purple eye-like spots on the base of the lip, and a stain of the same colour on the face of the column.

54. **Eria albiflora**, *Rolfe*; pseudobulbis aggregatis ovoideis v. ovoideo-oblongis, foliis oblongo-lanceolatis acutis basi attenuatis, scapis gracilibus pubescentibus, racemis laxifloris, bracteis oblongo-lanceolatis acutis, sepalo postico lanceolato-oblongo subobtuso lateralibus obliquis semiovatis subacutis, petalis lanceolato-linearibus subobtusis, labello rhomboideo-suborbiculari subobtuso v. apiculato concavo membranaceo, columna brevissima.

Hab. S. India, Nilghiri Hills.

Pseudobulbi ½–¾ poll. longi. *Folia* 1–2½ poll. longa, 2–4½ lin. lata. *Scapi* 3–5 poll. longi. *Bracteæ* 1–2 lin. longæ. *Pedicelli* 2 lin. longi. *Sepala* et *petala* 1½ lin. longa. *Labellum* 1 lin. longum.

This plant was sent to Mr. J. O'Brien, of Harrow-on-the-Hill, Middlesex, with whom it flowered in June 1891, and again in August of the following year; and it has also flowered at Kew. It belongs to the section *Bryobium*, and may be placed next to *E. articulata*, Lindl. The flowers are white, and are borne in a lax raceme on a slender scape. There is a drawing in the collection marked "Wynaad, Sept., Jerdon's sale, 1873," which is evidently the same species, but it does not appear to have been previously described.

55. **Cœlogyne tenuis**, *Rolfe*; pseudobulbis conico-elongatis monophyllis, foliis elliptico-lanceolatis breviter acuminatis sessilibus, scapis gracilibus paucifloris, bracteis lanceolatis acuminatis imbricatis deciduis, sepalis oblongo-ovatis subacutis concavis, petalis linearibus subacutis, labello trilobo lobis lateralibus semiorbicularibus intermedio ovato apiculato, disco tricarinato carinis lateralibus elevatis basi in laminam dentiformem productis, columna arcuata elongata.

Hab. Borneo.

Scapus circa 6 poll. altus. *Bracteæ* 5–6 lin. longæ. *Pedicelli* 4 lin. longi. *Sepala* 6 lin. longa, 2 lin. lata. *Petala* vix ½ lin. lata. *Labellum* 5–lin. longum, 2½ lin. latum. *Columna* 4½ lin. longa.

This species belongs to Lindley's section *Flexuosæ*, and may be placed next to *C. borneensis*, Rolfe (*supra* p. 62). It differs in its one-leaved pseudobulbs, slender scapes, and other characters. It was introduced by Messrs. Linden, of L'Horticulture Internationale, Brussels, with whom it flowered in August 1892. The flowers were somewhat withered when received, but appear to be of a light buff shade, with very few markings on the lip. The pseudobulbs and leaves are described from a reduced sketch.

56. **Epidendrum pumilum**, *Rolfe*; herba pumila, caulibus erectis foliosis verrucosis, foliis distichis sessilibus parvis cordato-oblongis bidentatis subconvexis, racemis terminalibus brevibus 3–4–floris, bracteis ovato-lanceolatis acutis, sepalis patentibus late elliptico-oblongis subobtusis v. minute apiculatis subconcavis, petalis patentibus spathulato-obovatis subobtusis v. minute apiculatis concavis, labelli ungue ad columnam adnato limbo trilobo lobis lateralibus parvis oblongis cum intermedio cruciatis intermedio late unguiculato apice dilatato bilobo lobis inciso-denticulatis callo late oblongo apice tridentato, columna brevi clinandrio late marginato carnoso truncato.

Hab. Costa Rica.

Caules 4–5 poll. alti. *Folia* 3–6 lin. longa, 2–3 lin. lata. *Racemi* vix pollicares. *Bracteæ* 1½–2 lin. longæ. *Pedicelli* 4–5 lin. longi. *Sepala* 3 lin. longa, 2 lin. lata. *Petala* sepala æquantia sed paullo angustiora. *Labellum* 3 lin. longum, apice 1½ lin. latum. *Columna* 2 lin. longa.

A pretty little species allied to *E. Endresii*, Rchb. f. (apparently the nearest ally which has yet appeared), but very different in the shape of its leaves and colour of its flowers. It was imported by Messrs. F. Sander & Co., of St Albans, with whom it flowered in January, 1890. Early in the present year it was also received for determination from Mr. F. W. Moore, Glasnevin Botanic Garden. The sepals and petals are light greenish yellow, also the lip, with the exception of the orange-

yellow callus. The column is very pale green below, nearly white above. As in *E. Endresii*, the sheaths of the leaves are covered with small brown warts.

57. **Polystachya imbricata**, *Rolfe;* caule erecto subgracili diphyllo, foliis oblongo-linearibus acutis, spicis ramosis congestis ramulis abbreviatis, bracteis imbricatis rigidis ovatis acuminatis, sepalo posticco ovato-oblongo acuto lateralibus obliquis basi pedi columnæ adnatis postico latioribus, petalis spathulatis, labello trilobo pubescente lobis lateralibus late rotundatis intermedio rotundato-oblongo apiculato callo quadrato, columna brevissima.

Hab.—E. Trop. Africa, Upper Zambesi River.

Caules circa 3 poll. longi. *Folia* 3½–4½ poll. longa, 5–6 lin. lata. *Bracteæ* 1–2 lin. longæ. *Pedicelli* 3 lin. longi. *Sepalum posticum* 3 lin. longum; *lateralia* 4½ lin. longa. *Petala* 2 lin. longa. *Labellum* 3 lin. longum.

This species was sent by Mr. J. O'Brien, of Harrow-on-the-Hill, Middlesex, with whom it flowered in August 1891. It may be placed near to *P. ensifolia*, Lindl., which, however, has much longer leaves and a lax inflorescence. There does not appear to be any species with which the present one can easily be confused. The sepals are pale yellow, the lateral ones suffused with pink along the margins; the petals straw-colour, and the lip pink, with a yellow callus, and wholly pubescent inside.

58. **Oncidium luteum**, *Rolfe;* pseudobulbis ovatis compressis, foliis lanceolato-linearibus obtusis, paniculis amplis laxis multifloris, bracteis ovatis acutis, sepalis unguiculatis lineari-lanceolatis subobtusis concavis, petalis breviter unguiculatis elliptico-oblongis apiculatis v. obtusis, labello pandurato lobis lateralibus orbiculari-oblongis intermedio obcori dato apice breviter bilobo crista circa 10-tuberculata instructo, columna brevi recurva basi in processum cornutum producta alis magnis basi-oblongis apice dilatato-tricuspidatis rostello elongato.

Hab. Not recorded.

Pseudobulbi 1¼ poll. longi. *Folia* 4 poll. longa v. forsan ultra, 6 lin. lata. *Panicula* 1½ ped. longa. *Bracteæ* 1½–2 lin. longæ. *Pedicelli* 5–6 lin. longi. *Sepala* 3½–4 lin. longa. *Petala* 3 lin. longa. *Labellum* 4½–5 lin. longum, 4 lin. latum.

This *Oncidium* flowered in the collection of Sir Trevor Lawrence, Bart., Dorking, in June, 1892, when it was sent to Kew for determination. It is closely allied to *O. chrysopyramis*, Rchb. f., but that species has invariably a broader isthmus to the lip, and a few other structural differences which seem to indicate the distinctness of the present one. Its flowers are uniformly light yellow, and borne in a large lax panicle. It belongs to a group of species in which the column and its elongated rostellum resemble the head and beak of a bird, from which one of the species, *O. ornithorhynchum*, Kunth, derived its specific name. Lindley distributed the species into four or five different sections, but they are so intimately allied as to leave no doubt of their forming one natural group, which may bear the name *Rostrata* (a name used by Lindley in a more restricted sense). About 20 species have been described, but several of them are still very imperfectly known.

59. **Luisia amesiana**, *Rolfe*; caule erecto, foliis teretibus rigidis subobtusis, racemis axillaribus abbreviatis paucifloris, bracteis patentibus triangulo-ovatis subobtusis concavis rigidis, sepalo postico elliptico-ovato obtuso lateralibus subobliquis lanceolato oblongis subobtusis, petalis

elliptico-oblongis obtusis, labello trilobo lobis lateralibus rotundatis brevibus intermedio orbiculari isthmo lato disci venis paullulo incrassatis, columna brevissima crassissima.

Hab.—Southern Shan States, Burma.

Folia 5–7 poll. longa. *Racemi* vix 1½ poll. longi. *Bracteæ* 2 lin. longæ. *Pedicelli* 9–12 lin. longi. *Sepala* 6–7 lin. longa, 3–4 lin. lata. *Petala* sepalo postico æqualia. *Labellum* 7–8 lin. longum, 5–6 lin. latum. *Columna* vix 2 lin. longa.

This species was sent to Kew by Messrs. Hugh Low & Co., of Clapton, in June 1891, who state that it was imported together with *Vanda Kimballiana*, Rchb. f. Thus its habitat must be on the hills of the Southern Shan States, at 4,000 to 5,000 feet elevation. Shortly afterwards it was sent by Messrs. F. Sander & Co., of St. Albans, who gave its native country as "Burma." It has since been received from Glasnevin. It is allied to *L. macrotis*, Rchb. f., but has flowers more than twice as large. The sepals and petals are pale yellowish white, slightly suffused with purple near the apex, and having a few obscure dull purple markings on the back. The lip is suffused with purple, and blotched with dark purple, the margin being light greenish yellow. The column is pale green.

60. **Habenaria cinnabarina**, *Rolfe*; pusilla, foliis erectis lineari-attenuatis acutissimis subconduplicatis, scapo foliis breviore (an semper ?), racemo pauciflore subcorymboso, bracteis subulato-lanceolatis acuminatis, sepalo postico erecto cucullato obtuso lateralibus patentibus subobliquis late semiobovatis obtusis v. apiculatis leviter carinatis, petalis erectis lineari-oblongis subobtusis, sepalo postico appresso galeam formante, labello trilobo lobis lateralibus semiorbiculari-oblongis minute crenulatis cum intermedio cruciatis intermedio oblongo obtuso calcari recto clavato, columna brevi rostello obovato-oblongo bidentato.

Hab. Madagascar.

Folia 3–5 poll. longa, 2–4 lin. lata. *Scapus* 3 poll. altus. *Bracteæ* 5–7 lin. longæ. *Ovarium* 5 lin. longum. *Sepalum posticum* 2 lin. longum; *lateralia* 2½–3 lin. longa. *Petala* 1½ lin. longa. *Labellum* 3½–4 lin. longum. *Calcar* 4 lin. longum. *Rostellum* vix 2 lin. longum. *Pollinia* 2½ lin. longa.

This species was introduced by Messrs. W. L. Lewis & Co., of Southgate, together with *Disa incarnata*, Lindl. and *Cynorchis grandiflora*, Ridl. The colour of its flowers is rather unusual, being cinnabar-orange, with a few red spots on the back of the sepals, and thus resembling those of *Disa incarnata* from the same locality. The plant here described has nine flowers and buds, but appears as if very imperfectly developed, and normal specimens may be much larger. It is very different from everything hitherto described from Madagascar, so far as can be discovered, but its exact affinity remains a little doubtful.

CCCXXIII.—EARLY HISTORY OF BUITENZORG BOTANIC GARDENS.

The historical account of Kew to 1841, published in the *Kew Bulletin* for December 1891, contained brief notices of the history of many Kew men who had been occupied with botanical work in different parts of the world early in the century.

Amongst these James Hooper was omitted, as, though his name was known, the facts of his life had been lost sight of. This omission is now remedied by the following interesting letter from the distinguished Director of the Botanical Garden at Buitenzorg in Java.

Dr. Treub to Royal Gardens, Kew.

Buitenzorg (Java),
April 24, 1893.

My dear Thiselton-Dyer,

You are aware, I suppose, that Reinwardt, who was Professor in Amsterdam and afterwards in Leyden, was the man who created in 1817 the "Government Botanical Garden ('s Lands-Plantentuin)" in Buitenzorg. In his proposition to the Colonial Government of 15th April (No. 53) Reinwardt pointed out: "There is now a rare as well "as favourable opportunity to get a very able and specially trained "man for the service of a botanical garden. It is a man named James "Hooper who, by special recommendation of Sir Joseph Banks, joined "the recent British Embassy to China. He stayed here to try to "get a position. There is not only that recommendation, but Mr. Abel, "the naturalist to the Embassy, and the Ambassador Lord Amherst "himself, gave me the best testimony as to Hooper's ability in cultiva- "ting and propagating plants. Lastly Hooper has had a service of "six years in one of the most renowned and richest gardens of Europe, "viz., in the Royal Gardens at Kew, where he has had charge of the "general cultivation of plants, so I may suppose him to be quite the "right man for the work I intend to charge him with."

This proposition of Reinwardt's being accepted, James Hooper was appointed by the Colonial Government as a "hortulanus" of the new botanical garden in Buitenzorg, at a salary of 150 guilders monthly, with free use of a government house.

There were two hortulani, but the other head gardener named W. Kent nearly always travelled over Netherlands India with Reinwardt, and afterwards left the Botanical Garden to enter into the civil service as an assistant of the inspector of the coffee culture.

So, in fact, James Hooper was head gardener of the Buitenzorg Garden from 1817 till 1830. His salary was raised to 250 guilders per month.

The 4th December 1830 J. Hooper left Java on furlough for Europe, in order to restore his health; he did not reach Europe, but died on board the vessel. He was succeeded by Teysmann.

Our first head gardener, who stayed here 12 years, having been trained at Kew, you see that Buitenzorg has from the beginning been greatly indebted to Kew. That "most renowned of European gardens," to make use again, after 76 years, of Reinwardt's words, has never failed since that time to give in the most liberal way help and assistance to the Buitenzorg Gardens.

Yours very sincerely,
(Signed) M. Treub.

W. T. Thiselton-Dyer, Esq., C.M.G., F.R.S.,
Royal Gardens, Kew.

The Embassy mentioned above was that of Lord Amherst to the Court of Pekin during the years 1816–17. The circumstances of James Hooper's attachment to it are detailed by Abel, who acted as naturalist to the expedition.

EXTRACT from the Preface to "Narrative of a Journey in the Interior of China," by Clarke Abel, F.L.S., London, 1818.

My appointment to the Embassy was at first simply medical, but through the recommendation of Sir Joseph Banks to the East India Company, I was permitted to take upon me the office of naturalist, and received an ample outfit of all the apparatus for scientific research. To give greater effect to my exertions in collecting and preserving the vegetable productions of the countries to be visited by the Embassy, a botanic gardener, from the Royal Gardens at Kew, taking out with him a plant cabin for the preservation of living specimens, was placed under my directions, and to assist generally in my pursuits my brother-in law, Mr. Poole, was allowed to attend me. With such facilities it would have been strange, even in countries often trod by scientific men, if I had not gleaned some new and important facts. But in China, scarcely touched by the foot of the naturalist, nothing short of a rich harvest could have been received as a token of my due exertions. The proofs of what these were, of their efficiency or abortiveness, are buried in the Straits of Gaspar. But it is incumbent on me to bear testimony to the exertions of Mr. Hooper, the botanic gardener, whose industry was equally unremitting and availing. His more peculiar department having been to collect and preserve seeds, he placed, on our leaving China, 300 packages in my keeping, many of which were taken from plants of undescribed genera, and by far the greater number from unknown species. They formed part of the shipwrecked collection.

After leaving the wreck of the "Alceste," I had the mortification of hearing that the cases containing these seeds had been brought upon deck and emptied of their contents by one of the seamen, to make room for some of the linen of one of the gentlemen of the Embassy.

The "Alceste" was wrecked on Pulo Leat. Lord Amherst and 32 of the crew succeeded in escaping to Batavia, where they were received with the greatest kindness by the Dutch governor. The remainder of the crew were subsequently rescued, but in the meantime the wreck had been burnt by the Malays including, as Abel records, p. 256, "a collection of plants, seeds, and minerals, which had been made in China." James Hooper evidently left the Embassy at Batavia, Abel returning to England.

CCCXXIV.—PRUNE CULTIVATION IN CALIFORNIA.

The following correspondence refers to the correction of an error in the table published in the *Kew Bulletin*, for November 1892, giving the foreign import and California production of prunes for the six years from 1885 to 1891 inclusive.

Monsieur GAJAC to ROYAL GARDENS, KEW.

MONSIEUR, Clairac, le 12 janvier, 1893.

M. COLCHESTER-WEMYSS a eu l'obligeance de m'envoyer le bulletin de Kew de Novembre dernier, et m'a procuré ainsi le plaisir de lire la notice qu'il contient sur la prune de Californie. Les quelques rapports que, grâce à M. Wemyss, j'ai eu l'honneur d'avoir avec

vous, Monsieur, me faut espérer que vous voudrez bien accueillir une double demande que je prends la liberté de vous adresser à propos de cet article.

La première concerne le tableau statistique qui termine la notice. Il contient d'abord l'importation totale des prunes aux Etats-Unis de 1889 à 1891 avec sa valeur en dollars. Ce renseignement nous interesse beaucoup, et étant officiel, il doit être exact. Or la seconde partie du tableau contient l'indication des quantités produites en même temps en Californie et leur valeur en livres sterlings. Là il me semble qu'il y a erreur et que les petites quantités indiquées pour 1886, 1887, 1888 n'ont pu produire les sommes qui leur sous attribuées.

Fixé par ce que dit la notice sur l'importance croissante de la production californienne et sur son prix moyen, je n'ai aucun intérêt à connaître les chiffres exacts qui doivent remplacer ceux que probablement une erreur d'impression a placés dans votre bulletin ; ce que je désiré savoir, c'est si la première partie du tableau est exacte en ses quantités de poids et ses nombres en dollars. Comme il n'y a guère que la Bosnie et nous qui concourions à l'importation, ce renseignement précis a de l'intérêt pour nous. Voilà ma première demande ; la seconde sera peu discrète ; je vous prierai en effet, Monsieur, de me faire tenir deux exemplaires de votre bulletin de Novembre dernier, si cela ne vous dérange pas.

Avec la confiance que vous voudrez bien excuser mon importunité je vous prie d'agréer, Monsieur, l'expression de ma considération distinguée.

E. Gajac.

Royal Gardens, Kew, to Foreign Office.

Sir, Royal Gardens, Kew, January 18, 1893.

I have the honour to inclose a copy of a letter which I have received from M. Gajac, a correspondent of the Royal Gardens, who is engaged on an important scale in the French prune industry.

He has received from Mr. Colchester-Wemyss, who a few years ago visited the French prune district for the purpose of studying the industry, a copy of the November number of the *Kew Bulletin*, in which Mr. Vice-Consul Moore's report on the prune industry of California was in part reproduced. M. Gajac draws attention to the statistics printed on p. 16 of the report, and these certainly seem open, as they stand, to some doubt. Taking two years, the California production stands as follows :—

——	Produce.	Value.
	lbs.	£ s. d.
1887 - - -	1,825,000	619,761 19 6
1889 - - -	15,200,000	294,071 1 5

It will be noticed that where the produce is in the latter year seven times as great, the gross value is only one-half. That an article of this kind should fall in value in the time to one-fourteenth seems improbable.

As M. Gajac has drawn attention to the matter it might be worth while having the accuracy of the figures tested. I may add that

M. Gajac gave Mr. Colchester-Wemyss the greatest assistance in his mission, which was all the more generous on his part, as Mr. Colchester-Wemyss did not conceal the fact that his object was to introduce the process of prune manufacture into the south of England.

I am, &c.

(Signed) W. T. THISELTON-DYER.

Sir Villiers Lister, K.C.M.G.,
Foreign Office.

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, Foreign Office, March 10, 1893.

WITH reference to my letter of the 23rd of January last, I am directed by the Secretary of State for Foreign Affairs to transmit to you, to be laid before Mr. Thiselton-Dyer, the accompanying despatch with reference to a previous report on the prune industry of California.

I am, &c.

The Assistant Director, (Signed) E. GREY.
Kew Gardens.

British Consulate, San Francisco,

MY LORD, February 18, 1893.

WITH reference to Sir E. Grey's despatches, Commercial No. 2, of the 26th November last, and Commercial No. 1 of the 23rd ultimo, relative to Mr. Vice-Consul Moore's report on prune culture, published in Report No. 245 Miscellaneous Series of 1892, I now have the honour to enclose a despatch, which I have received from Mr. Moore, dealing with this subject. Judging from the official source from which Mr. Moore obtained this information it was naturally supposed that the figures and text were correct.

In my Annual Report for the year I shall refer further to this matter.

I have, &c.

(Signed) DENIS DONOHOE.

Her Majesty's Principal Secretary of State
for Foreign Affairs, London.

British Consulate, San Francisco,

SIR, February 17, 1893.

IN reference to Foreign Office despatches, No. 2 Commercial, of the 26th November 1892, and No. 1 Commercial, of the 23rd ultimo, in reference to a report on the prune industry of California which I prepared last year, I have the honour to state as follows:—

My report was prepared, as stated therein, from that of the State Board of Horticulture, a bureau established by the State Legislature to further the interests of fruit growers by collecting and publishing statistics of fruit culture and of making known the opinions of the leading men of the industry as to the best and newest methods of horticulture, and anything that would assist in promoting and furthering the industry. The Commissioners are practical men, and some of them are among the largest and most successful fruit growers of the State. It would naturally be expected that a body of this description would be careful that anything published by it would be prepared with great care, and I was under this impression when I drew my information from that

source. From inquiries since made, I have come to the conclusion that their report on this subject was very carelessly prepared, and that many of the statements made therein are much exaggerated. As you are aware, I have written to the Secretary of the State Board of Horticulture for an explanation of some of the statements, but he has failed to reply. I then took steps to obtain information from a prune grower of experience, and will ask you to embody in your Annual Report, now in preparation, some information I obtained which will correct the exaggerated statements which appeared in my report.

The sterling figures are the equivalent of the currency column of the table, and do not apply to the Californian production at all.

The table should have been prepared as follows, which would have prevented any mistake being made.

Years.	Foreign Imports, by Years, ending June 30.		California Production, by years, ending December 31.
	Pounds.	Value in Sterling.	Pounds.
		£ s. d.	
1885	57,631,820	443,699 7 4	—
1886	64,995,545	418,717 19 4	2,000,000
1887	92,032,625	619,761 19 6	1,825,000
1888	70,626,027	453,956 12 1	2,100,000
1889	46,154,825	294,071 1 5	15,200,000
1890	58,093,410	369,663 19 2	12,200,000
1891	34,281,322	424,480 11 5	27,000,000

I have, &c.

Denis Donohoe, Esq., (Signed) WELLESLEY MOORE.
H. B. M. Consul,
San Francisco.

Since the above was in type, the following further information on the same subject has just been published in a report issued by the Foreign Office (Annual Series, 1892, No. 1293, Diplomatic and Consular Reports on Trade and Finance.—Report for the year 1892 on the Trade and Agriculture of the Consular District of San Francisco) :—

In regard to a report on the prune industry of California, which was prepared last year by Mr. Vice-Consul Moore, of this Consulate, and published in No. 245 of the Miscellaneous Series, Mr. Moore desires to state that the source from which he obtained his information was the Annual Report of the State Board of Horticulture of this State, and that from inquiries since made he has come to the conclusion that some of the statements that appear in his report are erroneous and exaggerated, and he wishes to correct them as follows :—

" In regard to the statement that Californian prunes brought higher prices than the imported article, this observation should only be applied to the 'prunes of commerce,' and not to the 'article de luxe.' The prune is consumed in this country principally by the masses, who use it for sauce (*i.e.*, stewing), and for this purpose it is superior to the French

owing to the fact that it is sun-dried, while the French has already been cooked in preparation being subjected in a 'drier' to successive heatings, 50° C., 70° C., and finally 90° C. For eating without cooking, however, the finest French prunes are still unapproachable.

"Instead of the outlook for Californian prunes as a profitable crop looking very bright for years or generations to come, it would seem that in a very few years the production will be so great that the producers will have to look abroad for a market. There has been a great deal of planting done in the last three years in Santa Clara county, as well as not a little in San Benito and Tulare counties. I understand that Alameda, Los Angeles, Orange, Solono, and Sonoma counties are all producing a considerable quantity, and no doubt in a few years the total will be enormous. It must also be remembered that Oregon raises Italian prunes. Mr. Lieb, a prominent fruit-grower of Santa Clara county, estimates the shipments from San José for 1893, with a full crop, at 50,000,000 lbs., and Colonel Hersey, another prominent gentleman in the business, is reported as saying that the trees now planted in that country (Santa Clara) will eventually produce 200,000,000 lbs. I give these estimates for what they may be worth, but no doubt production will shortly be very great, and prices fall, but this in itself will increase consumption, to a certain extent, among the 65,000,000 people in this country.

"The duty of 2 c. a pound on foreign prunes imported into the United States has had a great effect in stimulating the sale of the Californian article in the Eastern States, but whether they will succeed in entirely driving out foreign prunes from the American Markets will depend a great deal on the maintenance of this duty and on freight rates from here to the east. It is open to doubt if any over-prodution could be appreciably relieved by export except at very low prices. Consumption in Australia is comparatively small, and duty and charges very high. The cost of laying down in England is heavy and the demand light, and the fruit is required there in November, which for boxed goods is impossible.

"The average yield of fruit in Santa Clara Valley, the chief producer, is thought to be nearer 100 lbs. of fruit per bearing tree than 300 lbs. The calculation that it will dry out three to one may be taken as about an average. This would consequently produce about 33 lbs. of dried fruit per tree for Santa Clara Valley, and as that is an especially favourable location for the prune, the average for the state would be lower. The yield of 1,102 lbs. credited to a tree in Visalia is probably correct, but it is growing on deep bottom land, and such soil is limited in extent.

"The yields given for the third, fourth, fifth, and sixth years are regarded as unreliable for a properly pruned orchard, and if it were possible by light pruning to obtain such yields, which is doubtful, it would be the ruin of the orchard.

"There is an error on page 4 of the report, where it states that 300 acres near Templeton contain 324,000 prune trees. This should be 32,400 trees, at 108 to the acre.

"An error was also made in printing the table (already explained above)."

CCCXXV.—PLANT INDUSTRIES OF LAGOS.

The important colony of Lagos on the West Coast of Africa possesses such valuable resources that it is difficult to over-estimate them. Numerous articles have already appeared in the *Kew Bulletin* respecting the vegetable productions of the Colony, treating also of the very intelligent efforts made to develop them by the aid of the Botanical Station successfully established at Ebute Metta in 1888.

The experiments so far made in cultural industries are necessarily confined to the coast region. It is probable, however, that in time plantations will be extended into the fruitful Yoruba country, where the soil and climate are well suited to support a considerable industry. Very valuable information respecting the cultivation by natives already existing in Yoruba-land was prepared by Mr. Alvan Millson, and published in the *Kew Bulletin*, 1890, p. 238.

Recently a very important mission was undertaken by the Governor, Sir Gilbert Carter, K.C.M.G., into the interior of the colony, and the results are likely to prove of great interest. The indigenous plants noticed in the interior were collected by Dr. Rowland, the medical officer to the mission, and these are now being worked out at Kew.

In the meantime, the following correspondence has been communicated to Kew by the Secretary of State for the Colonies respecting visits paid to the eastern and western districts of the colony by the Deputy-Governor, Captain Denton, C.M.G., who was accompanied by Mr. Henry Millen, the Curator of the Botanical Station. Mr. Millen's observations are calculated to prove of general service in drawing attention to the present conditions of industrial enterprise in Lagos.

Colonial Office to Royal Gardens, Kew.

Colonial Office, Downing Street,
25th March 1893.

Sir,

I am directed by the Marquess of Ripon to transmit to you the enclosed copy of a despatch from the Officer Administering the Government of Lagos, forwarding a report by the Curator of the Botanic Station on the resources of the western district of the Colony, and I am to state that his lordship would be glad to be favoured with any observations which you may have to make upon it.

I am, &c.
(Signed) John Bramston.

The Director,
Royal Gardens, Kew.

The Officer Administering the Government of Lagos to Colonial Office.

Government House, Lagos,
14th February 1893.

My Lord,

I have the honour to inform your lordship that I was accompanied by the Curator of the Botanic Station on my recent visit to the western district, and I now beg to transmit a report by that officer giving his views on the resources of that part of the Colony and Protectorate from a botanical aspect.

Mr. Millen first deals with the cocoanut plantation at Badagry, and so far as I am able to judge, his remarks are perfectly correct. For a considerable time it was the practice to have the plantation cleaned at regular intervals by paid labour, but this appears to have been discontinued of late. No doubt it entailed a heavy expenditure, and it is a question whether an outlay of this nature is a legitimate charge on the public funds.

That cocoanuts will do well in the western district is proved by the plantation at Topo, which is in excellent order, and has progressed wonderfully since my last visit there 18 months ago. It must, however, be remembered that the mission lands are looked after by two priests, specially selected for the work on account of their agricultural experience, who have some 40 odd men and boys to assist them. Were the trees at Badagry to receive like advantages, I have no doubt that they would thrive equally well, but I cannot think that it is desirable for the Government to burden itself with undertakings of such magnitude.

I was not much struck with the coffee plantation near Ajilete which still has but little to show for the amount of labour which I understand has been expended on it. As yet no trees have been placed in their permanent positions, and I should say that not more than 25 acres of ground have been cleared.

It must be recognised that coffee planting near Lagos is an experiment, and looking to the quality of the land taken up, I am not too sanguine as to good results being obtained.

Captain Davies' plantation on the Itele creek has been established some years, and very fair cocoa is to be found in it. It has, however, suffered from want of capital and skilled experience, but were these forthcoming it should prove a very remunerative undertaking.

The great difficulty in all plantation work here is the labour; the natives of the country will not work except in the most spasmodic manner, and nothing can be effected unless men are imported from the Kroo Coast. And here again there is a difficulty, for the Krooman objects to be placed in the isolated parts of the country where the plantations are situated, and frequently runs away to Lagos. If brought before the courts of the Colony, he is of course punished for breaking his agreement, but this is of little real service as he takes his revenge on his master by doing the smallest amount of work possible when he is sent back to the plantation.

Mr. Millen reports that rubber-growing trees are abundant from Shagbo to Ilaro, and he undoubtedly found some very fine specimens of the *Landolphia owariensis*. Great difficulty has been experienced in obtaining the services of trained rubber collectors, but I hope that in time this may be surmounted. At the present moment the Government have an experienced man collecting rubber in the neighbourhood of Jebu Ode, and later on it may be worth while to send him to Ilaro for a similar purpose.

With regard to the *Raphia vinifera* palm, this abounds in all parts of the country. There is already a small trade in the fibre or bass obtained from it, and I have every reason to believe that it will be very largely increased during the next twelve months. Should my expectations be realised, it should prove an important addition to the exports of the colony as the supply is practically inexhaustible.

I have, &c.

(Signed) GEORGE C. DENTON.

The Most Hon. The Marquis of Ripon, K.G.,
&c. &c. &c.

(Enclosure.)

Botanical Station, Ebute Metta,
9th February 1893.

Sir,

I have the honour to forward for the information of the Deputy Governor the following report on my visit to the Western District.

The first plantation visited was the Government plantation at Badagry, situated close to the sea. Here a large area is devoted to the growing of cocoanuts: these trees are in two stages of growth, the larger ones are in a healthy condition, the younger ones are not established yet. Attention is required to clear away the long growing grass which surrounds them. A small quantity of the *Sansevieria guineensis* is also grown, the leaves are small, but I believe this is due to the dry season. A strong and useful fibre is obtained from the leaves of this plant.

A short distance from the town of Ajilite a coffee plantation is in course of being laid out by European enterprise. The work of clearing the ground is being done, and preparations made for planting out during the next rains. A nursery for raising young plants has also been established, and about 18,000 seedlings are now ready to be planted out, while a large quantity are in a less advanced state. Mr. Campbell calculates to plant out 40 acres in the next rains. The soil is a loamy marl, and is said to be workable at all seasons.

The plantation at the Catholic Mission, Topo, consists of a large portion of land on the sea side of the lagoon opposite the village of Topo. A large area has been planted with cocoa-nut trees, which are represented in all stages of growth. About 23,000 have been planted out, while 15,000 are in the nursery ready for planting. The trees are in a healthy and flourishing condition. Among other things cultivated may be mentioned cassava, banana, and pine-apple. An European vegetable garden is also connected with this plantation. It is situated in low moist ground, a stream surrounding it, and the soil is rich in vegetable matter. Under these conditions vegetables grow luxuriantly. Attached to the Mission is an agricultural school. Here part of the day is devoted by the scholars to work connected with the plantation. The estate is kept clean and in a flourishing condition, and is highly creditable to those superintending the work.

The next plantation I visited was that belonging to Captain J. P. L. Davies, near Itele. This was the first one established in the Colony. Captain Davies introduced cacao or chocolate plants from Fernando Po some years ago, and has now about 10,000 trees planted out, many bearing fruit. The land here is well suited for cacao, as can be seen by the flourishing condition of the plants. The plantation is surrounded by low swampy ground, from which there is a gradual rise to a low plateau. The principal plants grown are: cacao, kola, annatto, cocoanuts, and a few coffee plants. Several tons of commercial cacao are shipped annually from this plantation, the last consignment realising 62*s.* per cwt. I pointed out to Captain Davies that the trees required pruning. The pods produced were a good size, and the beans fully matured. A good plan, and one which answers well in planting cacao, is being followed on this plantation. Roads are cut running parallel through the forest about three yards wide; the cacao plants are then planted in the centre, the growth of trees on each side forming shade, under which the plants thrive well as they become established. The growth on the sides can be cut away when necessary. The plantation consists of 300 acres, and Captain Davies, who takes a great interest in it, would with more regular and abundant labour be able to keep it in a workable condition.

Collecting Plants. It being the dry season it was not a suitable time for making a good collection of specimens for the Herbarium, and many of the plants were in seed. I collected about 50 specimens, most of these being collected in damp and marshy ground. A number of living plants were also collected, which will be planted in the gardens.

Rubber. *Landolphia owariensis*, *L. florida*, and an unnamed species. These plants are found almost everywhere in more or less abundance, especially between Shagbo and Ilaro. The rubber is not collected, though there is no doubt, if properly sought for, sufficient plants would be found to bring in a good supply.

Timber trees. One of the largest trees met with in the forests is the Iroko tree (*Chorophora excelsa*). This wood is much used for building on account of its durability. *Adansonia digitata* is frequently seen. *Ficus guineensis* and other species are found in large quantities by the streams and in marshy ground. *Cola acuminata* trees grow wild in the forests round Ilaro; they appear to flourish best under the shade of the forest trees.

Palms. The oil palm, *Elæis guineensis*, is found in large quantities near the water. *Raphia vinifera* (Bamboo palm) abounds in the swamps one passes after leaving Badagry. Its fibre does not appear to be collected although it is so valuable. From this palm, however, the natives not only extract their favourite beverage, palm wine, but its young branches are used for thatch, and for the framework in the walls and roofing of their houses. A kind of *Calamus* is very common. It is used by the natives under the name of "tie-tie" in lieu of string or rope, and also for making baskets, &c.

Aquatic plants. *Cyperus Papyrus* fringes the banks of the rivers and streams, and is continually blocking the waterway. This plant has been known from an early date, being the well-known papyrus reed of the Egyptians. *Pistia stratiotes*, a floating plant, also abounds in the small creeks, the water being sometimes completely covered with it

Strophanthus Kombe and another species are found growing here and there in the forests. The seeds are used in Central Africa for poisoning arrows. There is a demand for them in Europe.

A species of *Vanilla* is found in damp forests attached to trees. I could not obtain specimens of the flower. It would be interesting to find whether this plant produces beans at all similar to the vanilla beans of commerce.

If properly worked, and careful attention given to them, the prospects as regards the plantations in this part of the Colony are very favourable. Before planting it is necessary to obtain fertile land. Ilaro offers a fine field for plantations. The soil there is rich and prolific, and the land has an elevation of several hundred feet above the sea. Added to this, waterways traverse nearly every part of the Western District, which gives great facility for transport.

I have, &c.
(Signed) Henry Millen,
Curator.

His Excellency the Deputy Governor,
Lagos.

COLONIAL OFFICE to ROYAL GARDENS, KEW.

SIR, Downing Street, 22nd April 1893.

WITH reference to the letter from this Office, of the 25th ultimo, I am directed by the Marquess of Ripon to transmit to you a copy of a despatch from the Deputy Governor of Lagos, forwarding a report by the Curator of the Botanical Station of a recent visit to the Eastern District of that Colony.

His Lordship will be glad to be favoured with any observations that may occur to you in connexion with this report.

I am, &c.

The Director, (Signed) JOHN BRAMSTON.
Royal Gardens, Kew.

DEPUTY GOVERNOR, LAGOS, to COLONIAL OFFICE.

MY LORD, Government House, Lagos, 25 March 1893.

I HAVE the honour to forward the accompanying report by the Curator of the Botanical Station on a recent visit made by him to the Eastern District.

Mr. Millen took every advantage of the opportunity offered him of acquiring a knowledge of the botanical resources of this part of the Colony and Protectorate, and I submit that his remarks on the subject generally will be of value to those interested in the question.

I have, &c.

The Most Honourable (Signed) GEORGE C. DENTON.
The Marquess of Ripon, K.G.,
Secretary of State for the Colonies.
&c. &c. &c.

(Enclosure.)

SIR, Botanical Station, Lagos, March 9, 1893.

I HAVE the honour to submit for His Excellency the Deputy Governor's information the following report on my visit to the Eastern District.

This District is similar to the Western District, in having a good waterway. Many of the towns we visited lay on the banks of the lagoon, and so one had not so good an opportunity for exploring the forests in search of plants. Nevertheless, a small collection was made for the Herbarium, although at this season many plants are producing seed. A good many living specimens were also obtained, including plants of *Platycerium*, *Rhipsalis*, and epiphytal orchids, most of the latter belonging to the genus *Bulbophyllum*. The banks of the lagoon and the creeks which run into it have scarcely any other vegetation than the Bamboo Palm (*Raphia vinifera*) with stretches of Mangroves.

The first place we landed at after leaving Lagos was Epo. The land here is undulating and the soil good. Cassava, yams, and native vegetables are grown, and in the low valleys sugar-cane is planted. The forest round the town is being gradually cleared for cultivation. The natives seldom use the same land two years in succession, as it is not the custom here to enrich the soil with manure. Trees of the supposed Barwood and Strophanthus, and of *Sesamum indicum* were

growing wild. I collected several of these plants. A strong fibre, probably from the Baobab tree (*Adansonia digitata*) was being used for rope-making.

At Leckie large groves of the Bamboo palm (*Raphia vinifera*) abound, also *Elæis guineensis* or African oil palm. An unlimited supply of African bass fibre could be obtained in this district. The soil is very sandy, and being close to the sea, the land is very suitable for the cultivation of the cocoanut palm.

The Government has a plantation consisting of about 8,000 plants; these are planted in rows along the seashore, and appear to be in a healthy condition, many of them have already begun to bear fruit. Coffee has also been tried here in a small way, but its cultivation was not attended with success.

On leaving Leckie and proceeding towards Artijere, the Bamboo palm is replaced by trees, one of which is the Frankincense tree of Sierra Leone (*Daniella thurifera*). Many of the trees are covered with epiphytal plants of the orchid family. Yams, cassava, and sugar-cane are the principal products. From Artijere, Itebu is reached by a fine river, the vegetation on each bank being chiefly the Bamboo palm. Past Itebu, Ayesan is reached, which is a large town some height above the river. The soil along the banks of the river here should be rich in vegetable humus, obtained from the decayed palms and trees, and would therefore be suitable for the cultivation of many useful plants. A small plot of coffee is being grown in the neighbourhood, and by the account given it was thriving satisfactorily. I succeeded in collecting several interesting plants in this neighbourhood.

I have, &c.
(Signed) H. Millen, Curator.

Royal Gardens, Kew, to Colonial Office.

Sir, Royal Gardens, Kew, July 6, 1893.

I am desired by Mr. Thiselton-Dyer to acknowledge the receipt of your letters of the 25th March and the 22nd April last, forwarding copies of despatches from the Deputy-Governor of Lagos, with Reports by the Curator of the Botanical Station on recent visits paid to the Eastern and Western Districts of the Colony.

2. The collections of plants made by Mr. Millen in these districts were received at Kew in June last, and they have now been examined and determined. The plants were in an excellent state of preservation and fully labelled. Many species have proved to be new, and the results are very creditable to Mr. Millen, who should be encouraged to continue to collect plants and to furnish useful notes respecting their properties and uses. A complete list of the plants included in Mr. Millen's collections is enclosed herewith. This may be forwarded for the information of the Government of Lagos, and also be communicated to Mr. Millen.

3. The valuable information contained in the despatches of Captain Denton, C.M.G., the Deputy-Governor, and in the more detailed reports furnished by Mr. Millen, afford a very clear idea of the present condition of some of the plant industries of the Colony. Many of these were started, in the first instance, by the late Governor, Sir Alfred Moloney, and there is little doubt that they are capable under the judicious guidance of his successor, of being greatly developed in the future.

4. Mr. Thiselton-Dyer would be glad, with the permission of the Secretary of State, to publish these papers in the *Kew Bulletin* so as to bring them under the notice of many in this country who take an interest in the welfare of this portion of our Colonial Possessions.

I have, &c.

(Signed) D. Morris,
Assistant Director.

John Bramston, Esq., D.C.L., C.B.,
Colonial Office, S.W.

CCCXXVI.—MISCELLANEOUS NOTES.

Stapelias.—The collection of Stapelias formed by the late Mr. Thomas Westcombe, of Worcester, has recently been presented to Kew by his sister, Miss Westcombe, along with numerous notes, descriptions, and a collection of beautifully executed coloured drawings, prepared by Miss Westcombe from the plants (of *Stapelia* and allied genera), flowered by her brother. Stapelias are exceedingly difficult plants to cultivate, and many of the species can only be kept through an English winter with the utmost care and attention. Mr. Westcombe's success as a cultivator of these plants was quite exceptional. Since his death some of the plants have somewhat suffered, but most of them will probably recover in their new quarters at Kew.

Hippeastrum procerum.—This is the blue Amaryllis of horticulturists, and the Amaryllis Rayneri of *Botanical Magazine*, t. 5883. It was introduced by M. Binot from South Brazil about 1863, but it has remained rare in cultivation, probably on account of the difficulty experienced in getting it to flower. Two plants of it are now in flower in the Succulent house (No. 5) at Kew. The species is quite distinct from the rest of the genus, the bulb having a neck 18 inches long and distichous falcate ensiform leaves, firm in texture, with a white cartilaginous edge. The flowers are borne in an umbel, and they are as large as the Belladonna lily. The colour is bluish-lilac with numerous spots of a darker shade of purple.

Sansevieria Kirkii, Baker.—This plant was described in the *Kew Bulletin*, May, 1887, in a paper on Bow-string Hemp. It was sent to Kew in 1881 by Dr., now Sir, John Kirk, having been found growing on the mainland opposite the island of Zanzibar. Some of the leaves on the plants received at Kew were 9 feet long. Sir John Kirk wrote that from the length and quality of the fibre of the leaves "it is a plant worth being introduced to our tropical colonies." A sample of the fibre prepared by Death's fibre machine was reported by Messrs. Ide and Christie to be "A very bright, clean, strong fibre, and in every way a most "desirable commercial article. It would compete with the best Sisal "Hemp for rope-making purposes. Value 30*l.* per ton." The plant has been propagated at Kew, and distributed to various colonies both east and west. From its behaviour under cultivation here it is probable that the leaves take several years to grow to their maximum length. There is an example of the plant now in flower in the Palm

house at Kew, from which a figure has been prepared for publication in the *Botanical Magazine*. It may not be generally known that small pieces of the leaf of any species of *Sansevieria* will strike root and form plants.

Hanbury Medallion.—The museum of the Royal Gardens has lately become possessed of a medallion portrait of the late Daniel Hanbury, F.R.S., F.L.S. This medallion is the original model in plaster by the late Thomas Woolner. R.A., and was copied in marble for Mr. Thomas Hanbury, F.L.S. It is a faithful likeness of the great pharmacologist. The ornamentation on the flat surface surrounding the portrait represents the plants to which Daniel Hanbury gave special attention, namely, *Liquidambar orientale*, Mill, which he proved in 1857 to be the source of Liquid Storax, and *Ipomœa simulans*, a species of his own, and described by him in a paper read before the Linnean Society in 1869 as the source of Tampico Jalap. Kew is indebted to Mrs. Woolner for the gift of this medallion, which finds a fitting home in a museum greatly enriched by numerous contributions of vegetable drugs made by Hanbury himself during his lifetime.

A Synopsis of the Museæ.—Mr. J. G. Baker, the Keeper of the Herbarium, is the author of a monograph of this small though interesting group, which has lately been published in the *Annals of Botany*, 1893, pp. 189–222. The group stood greatly in need of revision, and this has now been done with the materials of the Kew, Calcutta, and British Museum Herbaria as a basis. The Genera are: *Heliconia*, having 29 species; *Strelitzia*, 4 species; *Ravenala*, 2 species; and *Musa*, 32 species. The new species are two of *Heliconia* and four of *Musa*. An economic point of importance elucidated by the late S. Kurz is repeated here. Concerning *Musa acuminata*, Colla, Mr. Baker writes: "Kurz, "who has studied this species carefully on the spot, says that a large "proportion of the Bananas which are cultivated in the Malay Archi- "pelago are derived from it, and that its best varieties are superior to "all those derived from *M. sapientum*, in quality and delicacy. Typical "*M. acuminata* is wild and has fruits full of seed. From this, several "seedless cultivated varieties are immediately derived, differing in the "colour of the leaves and fruit. They all have the leaves glaucous "beneath, and in one form the waxy bloom is so copious that torches "are made from it."

Flora of Mount Kini Balu.—The collection of dried plants from the above locality in N. E. Borneo, referred to in the *Kew Bulletin*, 1892, p. 249, has been worked out by Dr. O. Stapf, the Assistant for India at the Herbarium, who read a paper on the subject before the Linnean Society on the 15th June last, which will probably appear in one of the society's publications. In addition to the plants collected by the Drs. Haviland, Dr. Stapf, has also taken up a small collection from the same mountain, made by Sir Hugh Low some 40 years ago, together with a few plants collected more recently by Mr. F. W. Burbidge. Altogether they number about 400 species, 320 of which are phanerogams. There are two new genera and upwards of 150 new species, for the greater part shrubs. Melastomaceæ and Rubiaceæ largely predominate in the lower

elevations, and the last family is somewhat numerously associated with increasing numbers of Ericaceæ, Vacciniaceæ, Orchids, and ferns at higher levels. Noteworthy among the novelties are 11 very distinct new species of the ericaceous genus *Diplycosia*, and two new species of the Australian irideous genus *Patersonia*. Many other new facts have been brought to light by the combined collections, and Dr. Stapf's paper promises to be of more than ordinary interest.

Jodrell Laboratory.—The following work has been done at the laboratory since the appointment of the Honorary Keeper, Dr. D.H. Scott, F.L.S., who entered on his duties in September, 1892 (*K. B.*, 1892, p. 245) :— Prof. J. R. Green, F.L.S., of the Pharmaceutical Society, has been occupied, since the autumn, with an investigation of vegetable ferments, especially those occurring in pollen, and in insectivorous plants. His inquiry is still in progress. Miss Ethel Sargant has carried out in co-operation with the Hon. Keeper, an investigation of the pitchers of *Dischidia rafflesiana* (*see K.B.*, 1892, p. 284, also *K.B.*, 1893, p. 113, and *Annals of Botany*, vol. vii., June, 1893). Mr. G. Massee has worked out, in the laboratory, the life-history of *Trichosphæria Sacchari*, nov. sp. an ascomycetous fungus parasitic on the sugar-cane. Dr. A. de Wévre, of Brussels, worked for a few weeks on the comparative histology of various species of *Piper*, with a view to the readier identification of the true *Piper Cubeba*. Professor R. J. Harvey Gibson, F.L.S., of the University College, Liverpool, spent some weeks at the laboratory, carrying on his investigation of the comparativeanatomy of the genus *Selaginella*, an inquiry for which the Kew collections afford special facilities. Dr. W. C. Williamson, F.R.S., and the Hon. Keeper, have been engaged at the laboratory in the joint investigation of the histology and morphology of fossil plants of the coal measures, commencing with the Calamites and their allies. For the purposes of this inquiry a portion of Dr. Williamson's collection has been temporarily brought to the laboratory. This work is in active progress. Mr. George Brebner is now employed at the laboratory in making drawings to illustrate this investigation. The Hon. Keeper has further been engaged in anatomical researches, on *Gunnera*, *Equisetum*, and other genera.

The late Keeper of the Herbarium and Library.—It will be remembered that Professor Daniel Oliver, F.R.S., keeper of the herbarium and library, retired from that office on the 31st May 1890, after more than 30 years service. The Board of her Majesty's Office of Works placed on record its high appreciation of the valuable services rendered to the Royal Gardens by Professor Oliver and bore testimony to "the distinguished ability which he had brought to bear upon the "work of his department . . . his labours contributed largely to gain "for the establishment at Kew that high position in the scientific world "which it deservedly enjoys." In 1884 the Council of the Royal Society had already awarded to Professor Oliver the Royal Medal. It is a pleasure to record that at the Annual Meeting on May 24, 1893, the Linnean Society awarded to this distinguished Botanist its Gold Medal. In handing the medal to Professor Oliver, the President, Professor Stewart, made the following speech, for which we are indebted to *The Journal of Botany* (1893), p. 193 :—

"On handing you the gold medal of the Linnean Society, it is my pleasing duty to recall to the memory of the fellows present, though

only shortly and imperfectly, some of the more interesting and important of your labours in botany; those more particularly which have induced the society to confer this medal upon you. First I would call attention to the very wide character of your botanical work. In 1850 you discovered, in Connemara. *Naias flexilis*, a genus new to the British flora. In 1859 you published, in our *Transactions*, a paper on the structure of the stem of *Caryophylleæ* and *Plumbagineæ*, illustrated with plates drawn by yourself; and in 1862 you contributed to the *Natural History Review* a memoir on the structure of the stem in Dicotyledons, with a critical bibliography of the subject. Then, in your series of 18 papers in the *Journal* and six in the *Transactions* of this Society, you turned to systematic, morphological, and geographical botany. These papers relate to all branches of phanerogams; there are several illustrating the flora of tropical Africa, including the whole of the 29th vol. of our *Transactions*, with its 136 plates; and you paid detailed attention to the Loranthaceæ, the Utricularieæ, the Hamamelideæ, and the Olacineæ, your artistic talents enabling you to illustrate beautifully and accurately these memoirs. The second point I would mention is the high excellence of this work. The investigations of more recent workers have confirmed, almost without exception, the accuracy of your observations and conclusions regarding the new genera and species established in these memoirs and elsewhere, notably in the *Icones Plantarum*, which you have now edited for three years wholly yourself. Thus also, in 1862, when geologists were discussing the Atlantis hypothesis, you showed in your paper in the *Natural History Review* that the botanical evidence was against that hypothesis, but that a close connection existed between the flora of tertiary Central Europe and the existing floras of Japan and the United States. The subsequent progress of geological discoveries has proved the soundness of the views advanced in your contribution to the controversy thirty years ago. The third point—and I desire to impress this on the members of the Society—is that much of your work is as yet unpublished; it is enshrined in the Kew Herbarium, where it has contributed largely to Bentham's and Hooker's *Genera Plantarum*, and to numerous memoirs which have been prepared wholly or in part at Kew. The last point I need touch upon is your educational work. Your *Lessons in Botany* is the most useful elementary book we have; your *Illustrations of the Natural Orders* and your guides to the museum and gardens at Kew have been eminently useful in spreading among the people an interest in Botany, and have led many to further study. As Professor of Botany for 30 years in University College, London, you have trained many pupils, now highly distinguished—not least among these being your successor in the professorial chair. With every good wish I hand you the gold medal of the society."

Plants and Excess of Moisture.—Some of the injurious effects of the severe floods that occurred lately in Queensland have already been noticed (*Kew Bulletin*, 1893, p. 147). Other injuries to plants were also felt, due, it is supposed, to the saturated condition of the atmosphere extending over a period of several days. In a note appended to the *Transactions of the Queensland Acclimatisation Society*, 1893, p. 40, Mr. William Soutter states that while numerous plants were destroyed in the Botanical Gardens at Brisbane owing to being submerged in flood water for nearly 10 days, others not submerged were affected "from prolonged exposure to a moisture-laden atmosphere." The

leaves of the scented Verbena (*Lippia citriodora*) and of the common garden geranium "presented an appearance of being partially boiled or scalded." A plant of *Sechium edule* was "even more strikingly affected." The old and young leaves and even the stem were alike injured. Mr. Soutter adds:—"In proof of the moist humidity of the "atmosphere between the dates before mentioned, a mulberry tree near "the back entrance to the gardens put forth from the upper branches "clusters of adventitious roots to a length of several inches. An old "plant of *Cocos plumosa* sent out all round the base a perfect cordon of "rootlets about three-eighths of an inch in diameter and from four to "eight inches long. A bamboo shoot from the 30th January to the "6th February grew a height of eight feet five and three-quarters of "an inch, or at the rate of nearly 17 inches a day. This growth was "exceeded by the growth of an aerial root of *Vitis pterophora*, which in "48 hours grew a rootlet of 39½ inches in length, but considering that "this was only one-eighth of an inch in diameter, it does not represent "such a mass of growth as the bamboo with its diameter of about three "inches. Many other plants have made great growth during the "period before mentioned. Crotons have grown several inches, as also "Coleus and other heat and moisture loving plants."

Garden Party at Kew Palace.—On June 17th, by permission of Her Majesty the Queen, the First Commissioner of Her Majesty's Works and Public Buildings and Lady Constance Shaw Lefevre gave a large garden party on the lawn and the reserve part of the Royal Gardens adjoining Kew Palace. The host and hostess, accompanied by about 200 guests, arrived at Kew by special steamers from the House of Commons Pier. More than a thousand people thronged the grounds by five o'clock to meet the Duke of York, the Duke of Cambridge, the Duke and Duchess of Teck, and Princess May. According to the *Times* the guests included the Maharajah of Bhavnagar, the Thakore Sahib of Gondal and the Maharanee, the Rajah of Bobbili, the Austrian Ambassador, the Italian Ambassador, Prince Louis Esterhazy, Earl and Countess Stanhope and Lady Katherine Stanhope, the Earl of Perth and Lady Edith Drummond, the Earl and Countess of Ducie, the Earl and Countess of Denbigh, the Earl of Dysart and Lady Huntingtower, the Countess of Crawford and Lady Evelyn Lindsay, the Earl of Carlisle, Countess Waldegrave, Viscountess Hampden and Hon. Miss Brand, Viscountess Wolseley and Hon. Frances Wolseley, the Bishop of Gloucester and Bristol and Mrs. and Miss Ellicott, Lord and Lady Coleridge, Lord and Lady Esher, Lord and Lady Playfair, Lady Frederick Cavendish, Lord and Lady Wantage and Lady Jane Lindsay, Lord and Lady Walter Gordon Lennox, the Earl of Darnley and Ladies Bligh, Lord Acton and Hon. Miss Acton, Lady Carew, Lord and Lady Wynford, Lord Roberts, V.C., Hon. Lady Ponsonby Fane, Lord and Lady Chelmsford, Lord Monkhouse, Lord Sackville and Miss Sackville West, Lord and Lady Morris and Miss Morris, Sir Algernon Borthwick, M.P., and Lady Borthwick, Sir Joseph Dalton Hooker and Lady Hooker, Sir Richard Temple, M.P., and Miss Temple, Sir G. Trevelyan, M.P., and Lady Trevelyan, Sir Richard Quain, Sir John Mowbray, M.P., Sir John Pender, M.P., the Speaker, Mr. and Mrs. H. M. Stanley, Mr. Frank Lockwood, Q.C., M.P., and others. After the garden party many of the guests visited the conservatories and collections in the Royal Gardens.